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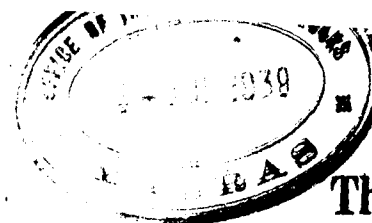
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The Geographical Personality of India *

By

N. SUBRAHMANYAM, M.A., L.T., F.R.G.S.

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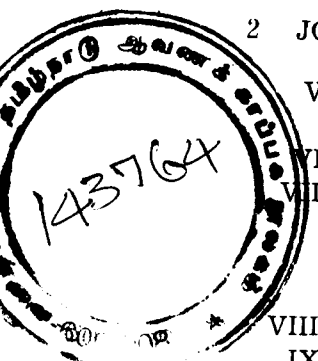
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*The Presidential Address delivered at the section of Geography and Geodesy in the Sessions of the Indian Science Congress Association held at Lahore, January 4, 1939.



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The Future :

Physical and Human Factors

India's Civilization, Comprehensive, Composite

India is to be the Synthesis of the whole world

My first duty is to thank, on behalf of Geographers of India, the authorities of the Indian Science Congress Association, for their constituting permanently Geography and Geodesy as a separate section. Such recognition of the importance of Geography by the Premier Science Association of the land will prove of help, it is hoped, to stimulate Geographical Thought and Research in India.

In this Address, I propose briefly to deal with 'The Geographical Personality of India,' and dwell upon some Leading Geographical Elements in Indian Life, past, present and future; and I shall indicate, from both the physical and the human side, their basic and dynamical aspects. The theme is vast and each statement bristles with exceptions, only too many; still, it is of value to have a synthetic and panoramic view of those several forces at work, as they are only too often lost sight of.

2. 1. We are met to-day in the Punjab, a Region whose greatness is pre-eminently the gift of its Geography. Its situation at the head of India has given it importance throughout History; its fat plains, overflowing with milk and honey, respond to the

THE GEOGRAPHICAL PERSONALITY OF INDIA 3

generous touch of water, yielding yearly, corn and pulses and oil in abundance. Great as theatre of wars in the past, it is to-day the field where victories of peace are garnered, witness the engineering triumphs of the Triple Project; the several Water-works and Hydro-Electrics; or the Canal Colonies.

2. 2. *Punjab, a Cultural Cradle.*—Sheltered behind natural frontiers of loftiest ranges and spreading along mightiest rivers, it has been the cradle of Indian Civilization from Pre-Historic Times. The Soan Culture; the Harappa Civilization linked to Mohenjo Daro; the Dravidian or Sumerian and the Vedic Civilizations—all have had here their growth and development. To the Punjab belong the great names of Sanskrit literature, Vyasa, Panini, Patanjali; Kurukshetra; the Kuru-Panchalas and the Gandharas; King Poros; King Kanishka; the long line of Kashmir Kings; the great monarchs of Afghan Dynasties and the Mogul Emperors of Delhi and Kings from Prithvi Raj to the Sikh Ranjit Singh who ruled with supreme dominion over the Northern Punjab and N.W.F. Province.

2. 3. *Punjab, varied folks.*—In historical times, the mountain ramparts guarding the Punjab opened their gateways only to peoples more powerful at the time and shut them on the weaker ones—Persians and Greeks; Sakas and Huns; Arabs and Afghans; the Tartars and Moguls. It is only the last conqueror—the Britisher—who has come to the Punjab by way of the plains through the Sea-gate of India; and he, too, though himself no settler, has dowered on it his gifts of war and peace, enriching it like every other race and religion before.

2. 4. *Punjab, Great in the making.*—The British Sergeant has been very much abroad in the Punjab; and better disciplined men than the Panjabis, there are none, in the rest of India or even the world. The Hindu, Rajput, Jat, Mussalman and Sikh, all animated with burning zeal for their religion, have been bred to arms and can wield with equal dexterity the pen and the sword, vying with each other only in their willingness to render service. The modern composite civilization of India is developing best in the Punjab; and the strength of the Punjabi is the strength of India. The Punjab is India in miniature and India is a miniature of the world.

PART I—STATIC GEOGRAPHY OF INDIA.

3. 1. *Personality of India.*—Though a Microcosm in her infinite variety, India has her own Personality, great powerful and strongly marked off, by prominent features, from other countries

of the world. From Cape Comorin to the Himalayas, from the Yomas on the East to Eastern Afghanistan on the West, there is a Geographical Unity binding land to land in bonds of Sun and Wind and Rain, varied by relief and the sea. The fundamental unity is that of climate, which is hot and monsoonic, the cold season even of North India being but of short duration. There is, besides, a unity of civilization, colouring, shaping and regulating the lives of her men and giving them a common outlook. Historically, various cultures have entered into the making of her civilization; and in the diversity and range of those cultures lie the greatness and comprehensiveness of Indian Civilization.

3. 2. *India, not a Geographical Expression.*—India it has been said, is a Geographical expression, a saying adapted from Metternich and intended to stress the political disunion and want of cohesion evident at present. But her true frontiers have been set out by Nature; her civilization has been developed and evolved so as perfectly to befit and envelop her as her atmosphere. And if political union remains the last to be achieved on Indian Soil, slow as it is in coming, the struggles that are witnessed are but the pangs of its birth.

3. 3. *India's Frontiers in History.*—Throughout the ages of her long history, the dictates of her Geography have impelled her rulers to extend their realms to the natural frontiers. Political union has been the aspiration of her great rulers. That was the urge behind the Hindu Aswamedha (the Horse Sacrifice) of old, celebrated by the Powerful Monarch of the day in order to become the Suzerain (Samrat) and bring all India under one Umbrella (Ekachhatradhipati), be he the legendary Raghu or the Pandava, the historical Pushyamitra or Samudra Gupta. That was the urge behind the Moslem conquests of the Sultans and Padishahs of Delhi—Sher Shah, Akbar or Aurangzeb. The dictates of Geography it is that have been the urge behind British Expansion in India, through Wellesley, Ellenborough, Dalhousie or Curzon, successors all to the Great Mogul, eager to enter upon the entire heritage of the Mogul.

3. 4. *Some countries not within.*—Alone of the Mogul heritage, Afghanistan and the Hindu Kush have kept out of the British System, cherishing their innate Love of Liberty and their Independence; while the differentiations of two centuries have made them quite distinct from India. They were once Hindu and Buddhist before embracing Islam; they have had relationships of race and language and religion with the West Indus Regions. Historically, too, they were linked with India under

Hindu, Buddhist, Afghan and Moghul Rulers, until about hundred and twenty years ago.

3. 5. *Variations.*—Other countries have now and then come into, and gone out of, the British Indian Empire. It is India's destiny to win for British Raj territories like Burma and develop lands like Natal and East Africa until the Indian ladder is no longer wanted. Other such examples are Aden and Singapore. They do not belong to India.

3. 6. *Ceylon.*—The contiguous Island of Ceylon, but for modern political accidents, ought to have been part of it, by virtue of geographical unity, of similar civilization, and of ethnic affinities, both the Sinhalese and the Tamils there being but immigrants from the mainland.

3. 7. *Why, the Historical Difference.*—In establishing an Indian Empire stretching to the farthest extent of natural limits, the British have succeeded where their great predecessors failed. But then, the British have, at their command, all the resources developed by the knowledge of the West—by knowledge created only in modern times and, therefore, not available, to the former rulers of India,—for the purpose of mastering the baffling immensity of the problems, such an Empire presents.

4. *India, a Sub-continent.*—It should be remembered that India is a Sub-continent, considering her vast extent, her great size, her immense and diversified population, or her infinite variety. Thereby, every Indian question is rendered multiform and manifold, and made more complicated and difficult than are such questions in other countries. Be it the problems of defence or poverty, the removal of illiteracy or the conquest of malaria, the reconstruction of villages or the building of roadways, their magnitude and proportion underscore every effort and have first to be tackled and overcome and provided for, before any appreciable results can be perceived.

5. 1. *Climate.*—The climate, which stamps this extensive region with its unity, is moulded by India's situation and configuration.

5. 2. *Situation.*—On the face of the globe, her situation is half within the tropics and half within the temperate zone, which is however contiguous to, and in unbroken continuity with, the tropical part, and by consequence partakes of its features. And

she stands a Peninsula at the head of the Indian Ocean, flanked on either side by receding land masses, which reach down to South Africa on the West and to Australia on the East.

5. 3. *Configuration*.—Her configuration is a quadrilateral, whose two Southern Sides jut far out into the sea and whose Northern Sides cut her off from the land masses of Asia by huge mountain barriers of far-flung mountain ranges.

6. 1. *The Sun*.—Over the region thus bounded, the sun dominates fiercely; it burns with tropical and sub-tropical intensity, flooding it with blazing light and heat. The sun helps in making the soil; and (according to Dr. Dhar, the Bengali chemist) is the more potent factor in its nitrogen fixation. The energy of the sun calls up a luxuriant growth of tropical vegetation where water and other conditions of plant life are present. The sun gives the Indian, warmth, health, and wealth.

6. 2. *The Seasons*.—The regime of the sun has a marked influence on the cycle of seasons, which in South India are described as hot, hotter, and hottest; while in North India the hot season is succeeded by a cold winter of only about four months' duration, unaccompanied by snowfall and frozen rivers on the plains. In essence, India is a hot land, one of the hottest on the globe, the range of temperature varying from about 4°F., in the remote South to 40°F. in the far North.

7. 1. *Wind Circulation, The Monsoons*.—The difference in the sun's heating of land and water in the Northern and the Southern Hemisphere in spring and summer and in autumn and winter, creates extensive and mobile areas of low pressure; and generates the circulation of the winds, which, in India, definitely follow the seasons and are therefore called monsoons. They set in, in steady direction, from the South-West in spring and summer, veering to the North-East in autumn and winter. By these winds, nature tempers the climate to the people. For, the former, the S.W. coming from the relatively cooler southern seas, brings clouds and rain to mitigate the heat; and the latter, coming from cold masses, makes the cold season so very delightful.

7. 2. *Wind and Heat*.—The winds influence the temperature of the lands over which they blow, not only with their intrinsic hotness or coldness but also with their dryness or humidity. Hence, the steaming heat of Bengal and the dry heat of the Pun-

jab in summer; the bitter cold of Sind in winter and the humid cold of Eastern Himalayan Regions.

7. 3. *Wind and Power*.—The prevailing Winds blow over large tracts of country with steadiness and regularity for long spells at a stretch, and can be a primary Source of Power in India; and it is a wonder that it has not been yoked to the service of man by wind-mills designed to suit the several velocities of wind at the place.

7. 4. *Wind, Cyclones*.—It is not unusual in India for gusts of wind to blow gales and hurricanes and cyclones; when they occur, they spread devastation before them over hundreds of miles, felling trees, destroying houses, cutting up embankments and scattering boulders and rocks. Some of these have been known to career across, in unabated fury, from the East Coast to the West, a distance of over 300 miles.

8. 1. *Water Circulation, The Monsoon*.—Intimately connected with the Winds is the Circulation of Water. In so agricultural a country as India, the importance of water cannot be over-rated; indeed, it is said even of the Government of India that its finances are a gamble in rain. The people are accustomed to watch the skies for the monsoon-burst, the break of the monsoon; the village *Panchik* (the calendar-man) ekes out a livelihood, by forecasting for his place, the raininess of the year and its dates, as handed down to him and taught him by local observation, by a sort of rule of thumb.

8. 2. *Its Regularity*.—Fortunately, the monsoon rains, in a normal year, are regular, almost punctual, and visit places at appointed dates, as it were, like an Ocean-liner. The distribution of rainfall over the several dates is equally important with the quantity of rain falling; for, the several agricultural operations are timed to both.

8. 3. *Local Rain*.—From the wind-borne rain-clouds, each place gets of rain what it can, by virtue of its relief, both in elevation and aspect; of its situation such as proximity to the sea; and of its hotness, too. The highest rainfall in the world, over 500 inches, is at Cherrapunji in the East, in the Khasi Hills, the farthest destination of S.W. winds; and on the West, Jacobabad, which is in the region of the Indian desert (desert, for want of rain) has under 5 inches of rainfall. The plains of India are a great evaporating cauldron, the sun and wind evaporating agents; while the lee side of mountains suffer often from Drought.

9. 1. *Tank and Well*.—Excess of rain or its Want or its Inadequacy makes abnormal years; and against such visitations, a net-work of tanks impounding surface-water and linked, it may be, in series, and of wells tapping underground water, studs the lands where they are incident. These make some sort of provision against threatened Famine.

9. 2. *Rivers*.—The principal life-giving waters in India are her rivers. The Indus, the Ganges and the Brahmaputra, from their Himalayan snows to the sea, along with their tributaries from the Himalayas, the Western Mountains, the Aravallies and the Vindhya, make the soil and support life, spreading fertility over all the vast Indo-Gangetic plain. Together, they form the largest, the longest and the mightiest of river-systems, ever utilized by man. Their relief and gradient provide sources of power which have but just begun to be tapped.

9. 3. *Canals*.—Dams have been built across them; and hundreds of miles of canals, taking off them, water millions of acres and sustain human life by the million, where the bison browsed and jackals used to howl.

9. 4. *South Rivers*.—Other great River systems, south of the Vindhya, flow across the mainland; but they are not snowfed; and not all of these have been fully utilized. The best utilized are the Godavari and the Krishna and the Cauvery; and the least, the Narmada, the Tapti and the Mahanadi.

9. 5. *Floods*.—Sometimes, the Rivers overflow their banks; and then those floods are irresistibly destructive, as in Bengal in September last when over 20,000 square miles were submerged by them.

9. 6. *The Flood Problem*.—As an example of Indian problems, it may be stated that a Committee was appointed so recently as August, 1938, to study the Mahanadi system with a view to building dams across it, if only to prevent its frequent and destructive floods; one attendant circumstance being that, where it emerges into the plains, the area irrigable by canals is small relatively to the cost involved.

10. 1. *Drought and Famine*.—Whether rain-fed, river-fed, or canal-fed, lands in India are frequently subject to droughts, and then the gaunt spectre of famine stalks over the land. Modern Transport brings relief to distressed areas; and upon their experience, the British have built up a regular Famine Code to deal with

it promptly and to mitigate its incidence. But modern famines, however, are due to want of pence rather than want of water, to economic rather than geographical causes. Be that as it may, the loss of human life is appalling; and that of cattle is beyond description.

10. 2. *Famine of two Kinds*.—Famine is said to be the skeleton in the cupboard of British India; but it is true also of Indian India and Past India. Geography reveals the true character of famines by polarizing the famine into two, and showing how that part which is due to Geographical factors is ever being alleviated, instead of being aggravated, by expansion of irrigation and similar public utilities.

11. 1. *Coast and Sea-life*.—India has an extensive Coastline of over 3,400 miles—over 4 times Germany's—presenting on the East Coast surf-beaten and breaker-swept sandy shores, and on the West Coast, many a land-sheltered cove and harbour. Fishermen still ply their drag-nets, and *catamarans* and *masula* boats still ride on the surf, as in ancient days. It is a fact that the frail boats of India, following the wind, carried in those days Indian commerce and civilization to such distant countries as Sumatra (Sri-Vijaya), Java (Hindu Remains from 1st cent.) and Borneo (Yupa, Sacrificial post, of VI cent. A.D.); to Indo-China (Angkor-Vat); and Canton; and Japan (Bodhi Sena of South India there in VIII century A.D.).

11. 2. *The Sea-sense*.—But the Sea-sense has not had a strong development among Indian people. The coastwise plain is cut off by high relief; while the foci of Indian Civilization have been too far away in the Inland to receive the influence of the sea and to be influenced by Kaveripatnam or Musiris (Cranganore), Kalinga or Dwarka.

11. 3. *Indian Seamen*.—When the need arose, the Mahrattas of the West Coast developed into seamen, building ships and manning them; and the seamen of Chittagong are even to-day esteemed as laskars on British Liners.

11. 4. *Landsmen in Modern Crew*.—Such is, however, the modern division of labour that bands of men from Amballa, for example, (more than 600 miles from the nearest sea) find employment as firemen in British Steamers.

11. 5. *Sea, as Defence*.—So impossible it was to invade India by Sea in ancient and mediaeval times that the Indian Poet, Kali-

dasa, conceived of the Coastline as Ramparts and the Seas as Moats, together forming an impregnable defence. But the compass and the gun have made the European in his floating castle master of the sea and all it circles. And the Command of the Sea it is that has given India to the British, keeping out every other European rival.

12. 1. *Mountains as Defence.*—The Mountains form another impregnable chain of ramparts, extending and completing the sea-defences. The high, huge, and extensive Himalayan Systems are over 1,800 miles long; the Eastern mountains are clad with impenetrable forests; and on the West high bleak mountains protect India, opening only at seven passes. But it was through them that there poured into India all her invaders and conquerors but one. The British alone have come by sea, transmuted from Traders into Rulers by the heat generated in the Politics of India's Rulers of XVIII Century.

12. 2. *Mountains as Barriers and Frontiers.*—These mountains still remain, what they have been, the Natural Barriers and Frontiers of India; and the military concentration is in the Punjab and N.W.F. Province, where the Indian army keeps incessant watch and ward against the virile and warlike tribes of the borders and races of Afghanistan and Central Asia.

13. 1. *Forests, Varieties.*—Forests play a large part in India's economy. They are of various types, sub-equatorial as on the West Coast, growing teak and jack and sandalwood; sub-tropical as the sal and blackwood; alpine as in the Himalayas with deodar and chir, and juniper; terai at the Himalayan foothills with giant grass and bamboos, sheltering elephants; while all over may be seen the scrub jungle preserving game. Where forests are, there water is conserved, soil preserved from erosion, temperature lowered, and rain attracted.

13. 2. *Forests as Home.*—The forests have been the home and defence of the aboriginals and fugitive peoples, protecting them in their independence, as witness the Bhils, Oraons, Mundas, Gonds, Kolas of the Vindhya; the Santals and Khonds of Chota Nagpur; the Savaras of Agency Tracts of Ganjam; and the civilized Garhwals and Nepalese, in the Himalayas.

14. *Plateaux.*—The Plateaux have been so subdued to civilization that they are different from the plains only in the regime of climate and the potential power that relief may give them by way of waterfalls, etc. Such are the C.P. and Mysore.

15 *Plains, the Pagoda Tree.*—The vast Plains of Hindustan, provided with no natural defences save their own extensiveness like the Russian, fertilized by its mighty rivers, and civilized from ancient times, have been the cynosure of the world; and the wealth of India has been the standing temptation to all the world, through all the ages. Here grew the fabled pagoda tree to be shaken by the strong arm, in order to bear and yield its fruit. The land is wealthy still, bearing rich harvests and producing the manufactures of industrious folks.

16. *India's Self-Sufficiency.*—The first prominent feature of this extensive country has been its self-sufficiency. With its rich harvests, its famous looms and artisans, it used to meet and for the greater part, meets, to this day, most of the natural needs of civilized life by way of food, clothing and shelter.

17. 1. *Isolation.*—The most natural consequence of such a condition is isolation. This has been intensified by the Mountains which cut off India from her neighbours and by the Seas separating her from other countries by hundreds of leagues which were almost impassable by old-time ships. The mountains of the mainland have erected yet other barriers between the same folks and have carried the isolation further by creating inner isolations, isolation within isolation. Add to these the great forests and the different rainfalls and we have a geographical view of that double isolation.

17. 2. *Isolation within Isolation. Examples.*—For example, from Bombay in the North to Cape Comorin in the South, we have the Mahratta, the Kanarese, the Coorgi, the Malayalee, each feeling himself distinct, and jealous of his distinctness, from the rest of the world. From West to East along the Vindhya there are Hill Tribes feeling likewise; and Subregional Criteria such as mountain, forest, temperature and rainfall differentiate the Punjabi, the U.P. Wala, the Biharee and the Bengalee, from one another, filling each with gladness that he is not like the rest.

17. 3. *All making for Rigidity and Variety.*—One result of such isolation is the insusceptibility to outer influences as such; a rigidity within the larger framework. For the very same reason, there exists a rich variety in India of cultures differently evolved, each tenaciously holding by its own.

17. 4. *Isolation in Neighbourhood.*—The peculiarity of the inner isolation is that it is isolation in neighbourhood.

18. 1. *Toleration*.—From this twofold character, there have sprung up in India widespread Toleration; a willingness generally to live and let live; and an all-embracing catholicity of spirit.

18. 2. *Simplicity and Subjectivity*.—Again, the necessity of making the best of the area to which folks have confined themselves voluntarily or otherwise, has given rise to pervasive simplicity and intense subjectivity. Plain living and high thinking still commands respect in India (e.g. Sir P. C. Ray, Gandhiji, Malviyaji).

18. 3. *Spirituality*.—Further, all these factors have contributed to make India stress more the spiritual side and provide her with varieties of religious experience. It is sometimes said that the history of India has been the history of her saints. From the Vedic seers to Buddha, from Mahavira to Vivekananda, from Guru Nanak to Ram Tirath, there have been towering peaks of religious teachers, raining their influence upon myriads of followers. Sriji Aurobindo Ghosh is the latest Seer in the long line of India's spiritual mission. Even Emperors like Asoka and Akbar live on by their spiritual enlightenment while the glory of their regal splendour departed with them.

19. *Stability of Indian Civilization*.—These and other such factors have imparted, to Indian Civilization, the quality of Stability; and it has been able to survive the pomp of kings and circumstances of war; the tramp of invaders and marauders; and the insidious attractions of a different life.

20. 1. *Caste and Castism, all-pervasive in India*.—Next only to Isolation in range, and re-inforcing it with its ever-present power, stands Caste in India. It may have evolved at first as occupational differentiations; or as a mode of living together, side by side, of two different folks, without letting each be absorbed by, or in, the other. Caste has dovetailed itself into the Map of Life in India so perfectly, and plays its part so completely in domestic economy that even conquerors like the British, who in their own home, have none of it but class differences, manifest symptoms of Castism here. To remain aloof outside the contacts of business; to live, move, and have their being in worlds of their own kith and kin or race, may be merely the psychology of birds of a feather flocking together. A dread of miscegenation of two hostile or alien races or religions looms behind.

20. 2. *Caste and Occupations*.—But in India caste has developed further into trade guilds and occupations. Even now in cases where there is equality of opportunity, Caste determines the choice,

understanding by the term caste not only the Hindus but those others in India who observe it in all but name—the casteless Quasi-Caste. Of course, its ugly feature is the principle of hereditary occupations with resulting stagnation and the habit of looking up and looking down on one another.

20. 3. *Caste, subserving Social and Economic life, and alive*.—But because its roots are deep down in the social and the economic life of India, it leads a charmed life, denounced in theory but accepted in practice. Doomed to death but fated not to die, caste lives on. It lives on, not only because it ministers to the social and economic needs, if not vanities, of man in India, but also because it has ever been adapting itself slowly, gradually, if inevitably, to ever-varying demands of modern conditions of life.

21. 1. *Variety by Regionality*.—Variegated as is the indigenous culture by the double process of Isolation and Caste, it is quadrupled by geographical elements of each region. Hindu civilization retains, in the main, the features of its forest origin and nurture, though the forests have disappeared long since. This has been operated upon by the local geography of each considerable tract.

21. 2. *Desert Type*.—The thrifty habits of the Marwari and Multani, and in recent times, the Nattukottai Chettiar, make them the money-lenders and financiers of India. Those habits derive from their desert homes of Malwa and Rajputana and Ramnad. Men of Jaipur, Jodhpur, Bikanir, Alwar, Shikarpur, Multan are spread all over India; and they it is that back Indian Trade and Industry, taking any risk.

21. 3. *Mountain Type*.—The Mahrattas from their emergence into history have proved on many a battlefield their indomitable courage; their ability to hold their own; and their capacity to hold together. The Great War in which they were recruited to the army after long lapse of time has shown that those qualities are not accidental but inherent in them as the gifts of their mountain home. Added to their courage, is their skill in diplomacy and politics. Poona has been the nursery of statesmen, even in modern times. Ranade, Gokhale and Tilak are household names. One noteworthy feature is that the women of Maharashtra have been specially brave, accompanying their men-folk to battle and accepting with them death and glory.

21. 4. *River and Plains Type*.—River and plain have developed other types. The Bengalee is well-known for his intellect and

his great heart is susceptible to just emotions. He has been a leaven of intellectual and social life wherever he has settled.

21. 5. *River, Plains and Desert Type*.—The Sindhi, also belonging to river and plain but under desert influence, is energetic, ubiquitous, venturing abroad if he can make a pile of pice by bartering in the lion forests of East Africa or by hawking in the streets of Lancashire.

21. 6. *River, Plains and Mountain Type*.—Developed under river and plain and mountains, the Punjabi is strong of will and body and mans half the Indian Army.

21. 7. *Coastwise Plains Type*.—The dry coastwise districts of Madras send out the largest number of emigrants yearly and the Plantations of the British Empire—of Natal, Malayan States and Tropical Islands from Trinidad to Fiji—owe their prosperity to the untiring labour, exceptional patience and frugal living of Madras Coolies.

21. 8. *Plateau Type*.—It is remarkable that men of inland plateaux are least disposed to go abroad while those of rivers and plains are best disposed, as seen in the case of the Sindhi and the Bengalee.

22. 1. *Homogeneity by Geography, The Bengalee*.—Another geographical result is seen in Bengal, where the land is a well-watered level plain scarcely rising to three hundred feet in three hundred miles from the Sea. The Bengalees, despite all differences of caste, creed and colour, are more homogeneous than others in India; possess widely diffused general culture and are highly responsive to modern impulses, thanks to their travel-sense and sociability, which are themselves induced by their Geography.

22. 2. *The Sindhi*.—Geographical influences have moulded a similar homogeneity in the riverine and desert plains of Sindh.

22. 3. *The Punjabi*.—Another region where the genius of the place makes people homogeneous in spite of themselves is the Punjab.

23. 1. *Individualism of Mountain-dwellers*.—The largest differences are observable among the Mountain and the Forest folks, where each body of people clings tenaciously to its own, changing only when it must. They develop stern individuality.

23. 2. *Illustrations*.—Districts from Konkan to Orissa as well as Nepal and Coorg and N.W.F. Province furnish illustrations.

24. *Variety by Impacts from outside*.—This great variety in India due to all such causes has been increased, and not diminished, by the impact of cultures from outside.

25. 1. *Islam, a Great Levelling Influence*.—The Muslims of India are the largest in numbers of the Moslem world and among the most devout. Islam, moulded in the deserts of Arabia, strong with the strength of Central and Western Asia and sweet with the perfume of Persian Letters, has, for twelve centuries, been spreading its levelling influence in India.

25. 2. *Harijan Problem the least*.—It is a striking fact that the Harijan question is negligible in Sind and the Punjab, where Islam is prevalent, while it has remained a great question where Hinduism is strongest as in Kerala (Malabar).

25. 3. *Regionality in non-religious matters*.—Yet in non-religious matters, there are regional differences. To cite only a few examples: The Moplahs of Arab descent inhabit the valleys of Malabar; they are peasants and traders and have retained their Arab qualities. The Muslims of Bombay and Sind hold a most commanding place in the trade and commerce of India. The administrative talent of the Delhi and the U.P. Muslim is generally acknowledged. Several of the Bombay Trading Muslims have the joint family system.

26. 1. *Variety by Christianity*.—Christianity came to India early. The Syrian Christians of Malabar date from the first century A.D. But only when the Christian Powers of Europe came with the gunboat, first for trade and then for conquest, did proselytism commence on a large scale. The Inquisition worked at Goa and gusts of Christian zeal used to sweep over Pondicherry. The British kept aloof, letting their subjects live and worship their own way. They opened the door to the missionary only in the XIX century; and here, too, it is to be noted that the largest number of Indian Christians is in South India; and therein, in Malabar and contiguous districts, where Hinduism is strongest.

26. 2. *Variety of their Denominations*.—All the varieties of Christianity are here in India (except the Pre-Soviet Russian Church) with all their denominations.

26. 3. *Variety of European Culture in India*.—And in other than religious matters, the genius loci establishes its influence,

adding new varieties to the old. Along with their religion, the Europeans have brought their modes of life, developed in the cold countries of the Eastern Atlantic Seaboard. As observed before, they found the caste system in India and have fitted themselves into it, living apart in a world of their own, disdainful, it may be, and exclusive like caste-men. The variety among them, however, is not so much due to Indian Geography as to the Geography of their several homes; for, they have not settled in India so as to be subject to her influence.

26. 4. *Variety by Parsis, etc.*—The Parsis, fleeing with their sacred fire before the Islamic sword of Arabia, have found Asylum in India for 1,200 years among the Tolerant Hindus; and they have enriched their new home beyond all proportion to their small numbers. They have retained their usages and added to the Variety of India. Others like the Jews and Armenians need no special mention.

27. 1. *Variety by Sects, Jains and Buddhists.*—The Jains are an entirely indigenous sect marked out by the most delicate tenderness for life. We have passed by Buddhism, because Buddhism, born here, is invisible here. But Buddhism left the land of its birth not until it re-created and re-incarnated itself in India in Modern Hinduism, as in Congregational Worship in Temples; abstinence from meat; reverence for life, etc.

28. 1. *Variety by Food, etc. by Food Crops.*—The food of the people follows the lines of geographical distribution. Where ample water supply is available in summer (even in N.W.F. Province) rice is grown. It is the monsoonic crop and is the staple food of the Lower Gangetic Plains of Bengal, Behar, and Orissa; of Godaveri, Krishna and Cauveri deltas. Wheat requires less water and more cold and is grown in Central, Northern and Western India, being the staple food there. Ragi, taking much less water, is grown in Mysore. Millet takes up even lesser water; as Jowar and Bajra, it is food and fodder in the dry Inland Regions from South India to the Punjab. Barley, which stands much cold, is found in the U.P. and the Punjab. Of pulses, different kinds there are, suited to varieties of soil.

28. 2. *By Fodder Crops.*—In the pressure on land, the food-and-fodder crop is grown as double utility, for grain and straw, for man and beast. But the rural economy of many a place requires fodder being cultivated as such. Here, and in Haymaking, there is room for improvement.

28. 3. *By Oil-Seeds.*—Oil-seeds are grown following local variations of soil and climate, and enter into the dietary accordingly, each region selecting its own seeds. Malabar of the coastal plains uses cocoanut oil; ground-nut oil of the East Coast is displacing gingelly oil there; mustard oil is favoured by Bengal; and linseed oil by the C.P. and Guzerat.

28. 4. *By Meat.*—Meat is taboo to Jains and many Hindus; but even those who may eat it seldom can afford it. Sheep, goats, cattle and pigs are also reared for food. Over extensive tracts of land, there grow only thorny shrubs which no animals eat but goats, and which are fit for no other use. By the goats, they are converted into human values. India has therefore the largest number of goats.

28. 5. *By Milk, etc.*—Even those who do not take meat are by no means averse to milk and ghee. But their consumption is limited by the quantity available and the quality, which is seldom unadulterated.

28. 6. *By Fruits, etc.*—India is a land where fruits and nuts many be grown in tropical abundance, mango and jack; oranges, figs, and apples; walnuts, almonds and cashew; but the actual home demand, except in larger Towns, is too little.

29. 1. *The Indian Dietary.*—Examining Indian Dietary at Coonoor Research Station, Col. McCarrison has declared wheat to be preferable to rice and that the Sikh diet of the Punjab is an ideal one—the diet of *ata roti* (unleavened bread of whole meal) with pulses, vegetables, ghee and milk (eked out by occasional meat). Other dietaries disclose deficiencies of one kind or other. But the greatest deficiency of all is the wherewithal to buy food.

30. 1. *Role of Pansupari, etc.*—To Hindu and Mahomedan alike, the pansupari is welcome; and it is still the symbolic exchange of courtesies, friendliness and loyalties. There is a consensus in Northern India that pansupari and ghee-fried sweets are exceptions to mutually forbidden food.

31. 1. *Variety by Dress.*—While Geography makes available many a fabric for dress, climate makes the choice; and caste (in the extended sense) settles the shape, mode and style for every man, woman and child, departures from which are ruled, eccentric or idiosyncratic. In India, dress is expressive also of the man's culture, caste, and place in society as well as his rank and wealth.

31. 2. *The 'Fur Coat'.*—Lord Morley once illustrated his opinion of the unsuitability for India of certain political institutions, by resembling them to fur coat for India. So wide is the range of climate that there are parts of India like the Alpine valleys of altitudinous mountains, where a fur-coat would be very welcome to several millions, affording them cosy comfort against cold.

31. 3. *The Fabric.*—India produces Wool, and Silk, and Cotton more than sufficient to clothe her population. Silk (coming at first from China, in Sanskrit the Chinamsuka) is the luxury of the richer classes. Wool is available for North Indian cold, but is costlier than cotton. The fabric most generally used is simple cotton cloth for the hot days and Padded cotton for the cold. To pass into or out of quilts (Razai in the North or Bonda in the South) is to express the seasonal change.

31. 4. *The Indian Cloth.*—Until eight decades ago, India produced cloth for export, meeting all local demands. Her looms were renowned the world over. The Kashmir Shawl, the Benares lace cloth, the Madura Sari are still sought after. But gone are the days of the Dacca Muslin and such other cloths of fame.

31. 5. *The Indian Customer of Cloth.*—It is, however, the patronage of the poor man for which compete Bombay and Ahmedabad, Manchester and Osaka. Here is a case where Geography provides the fabric and an immediate market for the cloth but the utilization of the one with the other is subject to political conditions and economic factors: the cotton market of Bombay being one of the best organized and most sensitive in the world; and most efficient Manchester watching with Argus-eyes.

31. 6. *Khadi.*—Khadi, or home-spun and home-woven cloth, apart from political significance, is intended to turn the idle time of the Indian millions into self-helping use.

32. 1. *Clothing and Poverty.*—The number of yards a man buys multiplied by their price is a fairly constant factor showing the limitation of his means upon his desires. Favoured by the hot climate, and driven by necessity, the poor Indian goes about scantily clad. Gandhiji, that half-naked faqir of Mr. Churchill's description and received in audience, in such dress, by His Majesty, got into that, out of his longing to identify himself with the millions. A *langoti* (loin cloth) may be all a man's dress, in India: and *Sadhus* are known to brave the winter half-naked on bleak Almorah's hill, by inuring their bodies to it.

33. 1. *Sari, Dhoti, Tailored goods.*—The seamless Sari for women, so colourful and so picturesque, is an Indian evolution and has not yet yielded place to western types; the seamless *Dhoti* is for men. The *lungi* is favoured by the Mussalmans who more than the Hindus use tailored clothes, which seem to be of ancient Persian origin.

33. 2. *Shawls.*—In the cold season, in tracts where sudden chills may be expected, Shawls are carried, slung from shoulders.

34. 1. *Indian Styles adopted in the world.*—In World Geography the Pyjamas, Jodhpurs and Banians have travelled from India to other countries; the *Solar Topee* is an Indian adaptation of the hat, which, by the non-conducting pith of Sola plant, keeps off heat.

34. 2. *The Head-dress, the Turban.*—As observed above, dress varies from place to place and society to society; but in India, the head-dress of his apparel oft proclaims the man—and the local climate also. It varies from the Malayali and Bengali Nothing—which lets the oiled head reflect away the steaming heat—to the Fulness of the Punjabi Turban which rises, fold on fold, with tail behind, protecting the head and the nape of the neck from the fierce rays of the dry summer sun. Present a cloth to a field labourer in South India and he will tie it to his head as turban because of its protecting him from heat.

34. 3. *Generality of its use.*—The Turban used to be the article of dress common to all Indians; but in the last few decades the Fez cap distinguishes the Indian Moslem: and the hat is coming into vogue among English-educated Indians.

35. 1. *Variety by Colour.*—White colour reflects the heat falling upon it and black absorbs it; and accordingly, the favourite colour of dress in India is the white; while black remains unwanted; other colours lie betwixt and between.

35. 2. *Sense of Colour.*—The Indian woman has a delicate sense of colour; she chooses her sari to match her complexion; and India foots a colour-bill to Germany running into crores of rupees yearly.

35. 3. *Colour, as religious symbol.*—Two colours, the white and the saffron, have trailed from ancient times associations of Religious Symbolism. The white is expressive of ceremonial purity; and the saffron robe—its ground colour, of the earth, earthy—is the dress indicating neglect of material things, worn

by those whose gaze is heavenward-turned (the Sanyasi, the Faqir).

36. 1. *Complexion*.—The skin is the first of dresses; and the Sun has pinched the Indian skin black and brown, whereby the Indian labourer is better fitted for outdoor work under the Indian Sun than the colourless man.

36. 2. *Bathing*.—Pains are taken to preserve the complexion as well as to help the skin to function best. To bathe in oil is a common thing in India; and daily bathing is prescribed by Hindu Law-givers and is observed by the Hindus in their millions, even in biting cold.

37. 1. *Population*.—India contains some 36 crores, a sixth of the world's population, and bids fair to beat China in numbers.

37. 2. *Man Power of India helping British Commonwealth*.—This vast Man Power contributes to the strength and glory of the British Commonwealth and is ever drawn upon to supply British wants in men, whether for War or Peace—Ypres and Natal, for example, speak to that. At Ypres, the Indian army laid down the lives of its men, to stem the on-rushing tide of the German guns and gain time for the British to hurry up and form their lines behind. In Natal, the Indians have created paying gardens for British masters. It has been said that the Indian gardener, without whom many an Empire-country should lie waste, is an Imperial Asset costing but £2 an acre.

38. *Houses and Geography*.—The Houses of common people reflect the climate of their locality. We have, for example, in regions of little rainfall, the flat mud roof (Anantapur, Baluchistan); of abundant rainfall, the gable (Malabar, Bengal); of snowfall, the steep slope (Himalayan Valleys); etc. Their variety and adaptation are striking.

39. *Variety by Settlements*.—Two cities only are of over a million inhabitants. There are not forty towns with over 100,000 population; and not four hundred with over 20,000; while the villages number more than 700,000. It may, therefore, be said truly that India lives in her huts and cottages.

40. 1. *Village, the Unit of Indian Life*.—The village has been the unit of Indian life from time immemorial; and the Village community led its corporate life under its Panchayats (the Council of village elders). Thereby, it was enabled to survive fire and sword to which it would be consigned. Scarcely would the despoiler

depart when it would reform and re-establish itself and resume its life.

40. 2. *Villages, strengthening Cultural Features*.—To the villages is due no small share of the Stability of Indian Civilization and its Simplicity. Their self-sufficiency and their diffuse scattering over the wide spaces of India proved their salvation. Here, then, is a geographical cause (apart from intrinsic worth) for the survival, the continuity, and the antiquity of Indian Civilization.

40. 3. *Decay of Villages*.—Rulers came and Rulers went, but no one could hurt them all at a time; and the villages went on until very recent times, when internal decay began to set in and injure their vitality. The new forces of Modern India have contributed to the decay of villages, chief of which is the rise of towns.

40. 4. *The Indian's Village-Sense and Revival thereof*.—Yet so strong is the sense of village among Indians that there is yearning to reconstruct it. That is one of the planks of the Congress platform; and Wardha under Gandhiji is having a busy time of it.

41. *The Town*.—The aggregation of Villages makes the Town (e.g. Palghat, Madras). Towns have sprung up in the past as capitals (e.g. Delhi—there are seven Delhis, in ruins); as Governor's seats (Lahore, Peshawar); as fortresses (Multan, Gwalior, Bharatpur); as Holy Places (Benares, Gaya, Amritsar); as way-nodes (Dera Ismail Khan, Bezwada); as Sea-ports (Surat, Masulipatam, Calicut, Alleppey); as river-ports (Patna, Dacca); as market-towns (Hinganghat, Pollachi); as manufacturing-towns (Moradabad, Ludhiana); as camp-towns (Aurangabad), etc.

42. 1. *Variety in Sources of Power, Animal Power*.—The abundance of villages makes India take the leading place in animal husbandry. In the number of animals, their various kinds and their several uses, no other country comes near India.

42. 2. *Cattle*.—Cattle are the best used source of Power in India, next only to man. They are used to draw carts, plough fields, transport burden (they were mounts, too, formerly), raise water from wells, press oil from seeds, and do many an other duty in rural and urban life. Through them, waste straw and grass become converted into power; while yielding also food, as milk to the Hindu, as meat to the Moslem.

42. 3. *Cattle, in History*.—What made Tippu Sultan so formidable in History was his mobility through cattle, in days when

there were no railroads. Passing into British hands upon his fall, and annexed to the British Commissariat by Col. Wellesley (later, the Iron Duke), the Mysore cattle beat the Mahratta horse (at Assaye, 1803, etc.) finally. Even now, the army makes large use of cattle.

42. 4. *Other Animals*.—Elephants are tamed to man's service and they carry men, pile logs, draw guns. The camel, horse, mule and donkey have a regional distribution.

42. 5. *The Horse*.—But the horse, save for the army as at Hosur, Sargodha, and the Canal Colonies of India, is not bred for strength or quality; it does the humbler service of drawing ekkas, tongas, gharis and jutkas; and its endurance is remarkable as in the Mahratta days.

43. *Variety in Culture*.—Thus constituted and provided by Nature, India developed a level of civilisation not behind that of other peoples of the world, from earliest times till XVII century. From the third century B.C. to the thirteenth century A.D., men and women of India, both Hindu and Buddhist, spread the Light of India's Culture far and wide over Asia's Mainland and Islands, from near Ceylon to distant Mongolia, from far-off Bokhara (= Vihara, same word as Bihar) to remote Borneo and Japan. It is amazing how, with only the Faith that moves mountains and none of the facilities now available, waves of such Cultural Missions travelled over barriers of virgin forests and gigantic mountain ranges, of formidable rivers and perilous seas, of alien if not hostile races, religions, and tongues—over barriers that are stupendous even under modern conditions. And the peoples of those countries looked to India as their Spiritual Home.

44. 1. *The Cultural Lag*.—A definite Cultural Lag has supervened since XVIII century, Europe outstripping India with Modern Knowledge and Power.

44. 2. *Thereby Europe, ahead of India*.—The Grand Monarch, Louis XIV, may be compared with the Great Mogul, Aurangzeb; and the advantages are all in favour of the latter, save in the possession of loyal and able Generals, those of Louis creating and establishing the superiority of European Military Science and Service. That Superiority it was, which led eventually to the Supremacy of the British in India, who beat off their European rivals with their Command of the Sea. In the night that fell upon India in the XVIII century, the Mahratta held up the torch but contentedly dependent on borrowed helps (for example the French-trained Ibrahim Sahib

Garde at Panipat, 1761 and French soldiers elsewhere) missed the real source of European Power—Creative Knowledge. In these three centuries, XVIII, XIX and XX, Science and the Industrial Revolution with all their consequences have wrought in Europe a wondrous sea-change into rich and great power; and all the while, India has been fast asleep. Even to-day the value of Science and Creative Knowledge is dimly, if at all, realized in India.

45. 1. *Nature's Gifts to India, and Man's Use*.—We have seen how on the physical side, India is one of the countries best endowed by Nature; the gifts of her shape, situation and climate are an inexhaustible treasure. On the human side of utilizing them, men in India bring to bear their several gifts of knowledge, attainments, and varied culture; their caste (in the extended sense) creed and colour; their race and religion. And each takes his share of them in accordance with those dictates. Thus, the lucrative trade in hides and skins is a Hindu aversion but a Mohammedan occupation, though both the Hindu and the Mohammedan belong to the same place, say Vaniyambadi, and are at the same level of culture.

Even in this way Caste helps to diversify Indian Economic Life and to relieve pressure upon the same occupation in Static India, assuring its man a morsel of food and a chance to live by learning his caste trade and plying it. Hence also the clash of competition in fields of shrinking opportunities, occupations being limited in a Static India.

45. 2. *The Static Level*.—The India of to-day has reached its level, from static standpoint.

PART II—DYNAMIC GEOGRAPHY OF INDIA.

1. *Dynamic Geography*.—It is the province of Dynamic Geography to make an estimate of the forces that are or will be in operation; synthetically to see things together, and as a whole; and indicate their tendencies in the future.

2. 1. *India's World Relations*.—To begin with, India's World Relations fall under two heads, the Political and Non-Political.

2. 2. *The Modern World consists of three Groups*.—Under the dread power of modern weapons forged by Science and the Technicians, the Modern World is divisible into only three groups; potential Allies, Enemies, and Neutrals. None dare act singly.

2. 3. *Alliances sought*.—Neither Mr. Churchill nor Chauvinists can dare to plunge the British Commonwealth into a Prestige-war,

single-handed—catastrophe obviously waits on such an adventure. The British Commonwealth, too, has to seek Allies. Therefore, under modern conditions, what matters is, not so much what chinks in the armour there are, as what Alliances there are. Weak points in Defence are no more to be flung at India than at Britain.

2. 4. *India's Place in World Politics.*—India's place in World Politics is defined by her being part and parcel of the British Commonwealth. Its enemies are her enemies; its friends, her friends. Her King is the British King; her flag, the Union Jack; and she is under the protection of the British Navy and British Aircraft.

3. 1. *Isolation in External Politics.*—It follows that the Principle of Isolation, which has been described to be at work internally in Static India, is carried to completeness externally in the sphere of foreign affairs. By India's place in the British Commonwealth, World events cast their shadows upon her, only indirectly, through the British connection.

3. 2. *Non-Isolation Elsewhere.*—But in Non-Political Spheres, the great changes in the world at large, wrought by the Discoveries and the Conquests of Science, alter completely the Geography of EACH MAN'S Environment, especially by annihilating vast distances in time and space. They batter down the walls of isolation, both Internal and External, in Non-Political Matters. No longer can India lead a sequestered life, shut behind secluding frontiers. The Indian has for neighbours not merely the cottages of his village or the town ten miles off but the wide world itself.

4. *Remote Villages also linked to the World.*—By a Ford Bus, the remote villager can travel to his city a hundred miles away, transact business there, and return home by evening. To do so would have been an event of a lifetime before. And being where he is, he knows the prices current at distant Liverpool and remote New York within three hours of their settlement. The net result is, the villager is linked to the world. He may be in the heart of the Vindhyan forests or Himalayan mountain valleys. The narrow grooves of his former being have crumbled down. The world comes to him where he is, and knocks at his door; and he now looks on the world as his neighbour. (See also para. 21. 2, *infra*.)

5. *Caste also adapting itself.*—Like Isolation, Caste, too, has been feeling the impact; but such is its intrinsic vitality that it has been adapting itself to the varying demands of modernity. Not all

the power of Clive could save a caste clerk from being outcasted for involuntary defilement by meat being thrust down his throat by soldiers in a prank. Two hundred years, and what changes! At the annual Oxford and Cambridge Dinners at Calcutta, it is not unusual to find Indians form 30 to 40 per cent. who retain, for all their residence for years abroad, their pride of place in their Society.

6. *Self-Sufficiency broken into.*—It is in Self-Sufficiency that the New Geography finds the largest inroads. Formerly, in the villages, crops were raised for local consumption and life went on statically and at leisurely pace. Economic laws have brought more lands under the plough; crops are raised for cash more than ever before; new wants have sprung up; and the craving for comfort and amenities takes the place of the older contentment. (See also para. 21. 2, *infra*.) Migrations to towns are proceeding apace.

7. 1. *Attractions of the Modern Town.*—The multiple and complex Personality of Modern Towns generate centripetal forces that deplete their Hinterland-Villages of their men of light and leading; and others go thither in search of employment. The Collector's *cutcherry*, the Police Thana, Courts of Justice, Schools, Colleges and Hospitals, the Shop and Factory, the Rise of the Professional classes, Theatres Talkies and a hundred amenities of life, the wide chances of making a living (*fas et nefas*) or even of living on charity—all these modern causes act with compelling force. The Linking of Villages to Towns and of Towns to Towns by Bus and Lorry has quickened the pace. Deserted villages are resulting from all such causes.

7. 2. *The Growth of Cities.*—The City rolls out before one's eyes as a place of life and movement. The modern cities of British making represent and reproduce the Western World in India and vitally influence the hinterland towns and villages.

7. 3. *Calcutta.*—The capital of India has been shifted from Calcutta to Delhi. Calcutta, owing its rise to the British and its importance to its geography, nevertheless holds the first place in India not only as the city of palaces but as the city of capitals. Calcutta is the capital of tea, jute, coal, iron and steel, paper, and shipping; of Europeans in business; of Marwaris who are in all industries and finances; of University Developments; of Bengal Province; and of Bengalee Life itself.

7. 4. *Bombay.*—Bombay has the natural harbour that is nearest to Europe. Through the aspect of such situation, Bombay has risen from a small island to be the second city of India not

through the wealth of its hinterland like Calcutta, but by the enterprise of its citizens; for, they include the leading trading castes of India (in the larger sense of caste). The Rajabai Tower in Bombay is adorned with figures representative of them and they are representative of Bombay. The Business-European, the Parsi, the Khojah Borah and Cutchi Memons, the Bania, the Bhatia, the Kathiawari, the Guzerati, etc., jostle with one another in the market-place and meet on equal terms at the Stock Exchange.

7. 5. *Madras*.—Madras is a congeries of villages that gathered round the Fort, or had been there, before; and under its guns, secure from harm, it has grown by internal trade and external commerce. Its industrious and intelligent people provide officials, teachers, traders, clerks, coolies, etc. Its harbour, providing shelter on a surf-beaten shore and doing away with Madras Roads shows how the Spirit of Man (to wit, Sir Francis Spring, here) can transform Statical Geography.

8. 1. *Cultural Lag*.—There has been Cultural Lag. For three centuries, India has fallen behind. The leaven of new knowledge that leaveneth the whole lump of Europe has only recently begun to work in India.

8. 2. *The Universities*.—At the centres of knowledge—her Universities—until the end of the XIX century, the work in point of fact was only to produce men for jobs in Government service and the needs of administration, clerks and lawyers. It is only through the late Sir Ashutosh Mukherji and his work at the Calcutta University (from 1904 to 1924) that Universities are prepared to accept the ideal of, and make some provision for, creating and re-creating Knowledge. As observed by (the first) Lord Haldane, Modern Germany and Modern Japan have been made at the Universities, the latter without even producing any outstanding geniuses. In India, we are only just at the beginning.

8. 3. *Illiteracy Drive*.—All European nations set great store by Literacy; and Japan, also, boasts 98% literates under the Meiji Scheme. In India 8% is the literacy. To liquidate illiteracy in the land is fraught with difficulties, both Geographical and Financial. The population is scattered in villages over wide spaces and by long distances; they can be reached only with great difficulty by the Schoolmaster; he, too, is in need of a living wage in a capitalistic world unlike his forbears who taught, on the pial, letters to village brats, in return for doles of rice and pulses, oil and fuel. To spend yearly about Rs. 100 only on a village for

education is to find 7 crores of rupees yearly, for all. Other problems of health, sanitation, malaria etc., are in similar case, conditioned by magnitude and multitude.

9. *Dynamic Geography emphasises Progress*.—The new Geography can emphasize how, armed with the strength and power of Modern Science, man in India can visibly raise the Levels of Production and by fair distribution mitigate somewhat the appalling poverty of the people. What other countries have done with the weapons of Science, it is open to the Indian to do, for himself at least, if not for his country; for, even such self-regarding acts make Indian poverty by so much the less.

10. 1. *Illustration, the Old Geography of Japan*.—Statical Geography would describe Japan of eighty years ago as a typical Asiatic country improgressive, unchanging, doubly isolated by being insular and by isolating herself, and lost in a mediæval dreamy life.

10. 2. *The New Geography of Japan*.—Dynamic Geography shows how the Spirit of Man has made her outdo her European and American teachers. Rudely awakened by Commodore Perry's knock at her gate (1853) she has roused herself from her age-long sleep and has grown into their formidable competitor in world markets. She illustrates how one and the same Asiatic nation, with but Fifty Years of Europe, can pass by a Cycle of Cathay—at any rate, in material progress.

10. 3. *Japan, to-day, a maker of goods for India*.—Twenty-four years ago, Dinshaw Petit drew pointed attention to the singular fact that the Japanese ship in the Bombay Harbour unloads cotton goods and lades raw cotton. She buys pig iron and scrap iron from India and sells to India a hundred iron goods from pins to bicycles and galvanized iron-sheets.

11. *New Opportunities opening in India*.—The bread that such occupations give could be secured for the Indian, were there available technical and scientific knowledge that is real and true—and not merely Degree-ed—along with organizing ability and discipline.

12. *Other such openings*.—We may give examples of similar opportunities in the Dynamic Geography of India.

13. 1. *Agriculture*.—The tribute paid by Dr. Voelcker to the traditional skill of the Indian ryot holds good to this day. He leaves little room for improvement in his methods in crops within his range of experience. But in these fifty years since then, there

have been other crops to the fore; more lands are under tillage; the available water supply changes; new cheap manures (like sulphate of ammonia, activated sludge and town-refuse) have come to supplement the old, while the quantities available of the old are a shrinking factor. The proportion of cash crops to food crops and fodder crops requires constant adjustment.

13. 2. *Sugarcane*.—The Wizard of the Sugarcane at Coimbatore (Sri Venkatraman) has produced a cane for every variety of soil, water, and sun, enriching the sugar content and advancing the bearing time. The work of that Burbank has not yet been availed of by Indians in general, though taken up eagerly, to their profit, by the Europeans in Sugar of Bihar and the U.P.

13. 3. *Utilization of Land*.—In statical geography, the utilization of land has been carried out as far as possible in ancient districts like Tanjore and Patna. But on the dynamical side, we see new opportunities and new uses springing up. New vistas open through new demands, and demands for more and better stuff; for kitchen gardens and flower-beds in the hinter-land of growing towns; for groves of mangoes and cocoanut and jack; for fruit trees, nuts, oil-seeds, etc. The canning industry has not even struck root.

13. 4. *Utilization of Gain; of Produce*.—And whatever is won from nature is often lost to man through faulty storage and wasteful marketing.

13. 5. *Future*.—The New Geography visualizes improvements all round.

14. 1. *Fisheries, another illustration*.—Fisheries are another illustration pointed out by Dynamic Geography. Fish is not so widely consumed in India as it may be. But fish is a staple food of forty million population of well-watered Bengal. There and elsewhere, the demand can easily be made to create itself and whatever demand there may be, can be met entirely and cheaply, too, by the abundance of fish in Indian Rivers, Lakes, Ponds, Tanks and Seas. The trawlers of Japan (which is, like Bengal, a greatest consumer of fish) visit the Indian waters also, among other Seas of the world. Modern methods of preservation of fish from the catch to the consumption such as cold storage, ice-packing, keep the fish fresh for the table. The riches of Bengal are manifest on the subscription day of Government loans.

14. 2. *Fishery, utilization-Entrepreneur*.—Here then is a case where Geography can point to the potential development and utilization of the sea-acres and water-wastes: where all necessary factors are convergent. The utilization awaits the coming of an entrepreneur, preferably of Bengal, failing whom, of Britain or Bombay, who may soon take up the matter. Such a man (or a Company) can serve Calcutta with fresh fish from Chilka Lake brought in three hours of the catch by air-plane and reap the rich harvest of the sea. The non-utilization till now has always been a standing wonder to the Geographer.

15. *Modern Transport, an instance*.—Transport furnishes an instance where the opportunities are great and the problems are partly geographical, partly economic. Already, the Railways of India with their 41,000 miles of roads hold the third rank in the world though they do not as yet, make their own locomotives; and they can be expanded sixfold; so large a part of the country remains unserved by Railway.

16. 1. *Railways*.—Railways have created new life and culture where they traverse.

16. 2. *Railway in Andhra Country*.—The Andhra country throbs with new life, thanks to the East Coast Railways (now B.N. & M.S.M. Rys.) connecting it with Calcutta and Madras in the last forty years, and thanks to the modern irrigation projects of the Godavari and Krishna Anicuts.

16. 3. *Railway and Kerala*.—Shut up between the mountain and the sea, Kerala has been preserving many an ancient custom like the Hinduism of the Nambudris, the Impartible Joint Property (Tarwad) and its Laws of Descent. Before the Railway, the Malayalis used to lead a clean simple placid life with the simplest and best marriage laws in the world. The Railway has transformed completely their dress and manners, their outlook and life. Like Scotland, Kerala is the land of the mountain and the flood; like the Scotch, too, in education and thrift, the Malayalis have diffused all over India within the last forty years, thanks to the railway which has broken down their isolation.

16. 4. *Effect of no Railway*.—No Railway penetrates Nepal and Garhwal in the Central Himalayas, where Hinduism took refuge. Nestled in their mountain fastnesses, the Nepalese and the Garhwalis cherish their Independence and their Religion and preserve their customs unaltered. The Nilgiri Railway, on the other hand,

has brought in Modernity and has seriously affected Toda (Mountain) culture, along with other causes.

17. 1. *Motors*.—In this century of Motor Car, Lorry, and Air-plane, the last has great scope in the great distances of India, but will have only a weak development, unless Imperial necessities prescribe a large expansion. But the motor car and the lorry have been spreading phenomenally (thanks to Ford) and opening up the countryside and urbanizing the Villager's outlook.

17. 2. *Expansion*.—Less than 2 lakhs of motor vehicles are in India but even this number is to be checked so as to help up the falling Railway Revenue in which the State is interested. Unlike the case of flesh-drawn carts and waggons in Static India, the Railway and the Motor Car create their own traffic and swell its volume. The new opportunities are being fully availed of.

18. 1. *New Sources of Power*.—We have seen how Static India moves on Animal Power (Pt. I, 42. 1.).

19. *Coal*.—Coal has been found and used but the distances from the pit-heads of Giridih, Jherriah, Raniganj or Barakar are so great as to place it out of reach of many of a place in India.

20. 1. *Water-Power*.—Water-Power, where available, makes up somewhat for that. By virtue of Relief, the waters of India in their journey from their source to the mouth, carry immense possibilities of generating Power. With every development of Hydro-Electrics in the world, more and more of Indian waters are harnessed.

20. 2. *The Cauvery*.—Cauvery Falls at Sivasamudram was the first place to be installed in India; the Cauvery itself has been made to yield still more power at Krishnasagar Dam higher up, and at Mettur Dam lower down; and there are other places higher up as in Coorg where the same river can generate more electricity.

20. 3. *The Pykara*.—The Pykara River on the Nilgiris has been dammed and electricity is supplied from it to many a District up and down.

20. 4. *Others utilizable in South India*.—Gersoppa, the highest falls in India, is about to be yoked. The Adab in Jeypore State in Ganjam (Orissa) can be put to similar uses. With such 'white coal,' South India makes up for want of Black Coal and can meet all her requirements in Power; and she can grow 'green' coal, too.

20. 5. *Power and Industries in Mysore, Model for Future*.—A series of correlated industries has sprung up in Mysore, an augury of things to come in India through or under State auspices. To work Kolar Gold Mines, the Cauvery Falls was made to generate electricity, and Power transmitted on a 92-mile line (then the longest in the World). The Krishnaraja Sagar Project developing more power brings water to a lakh of acres and a quarter. Still more Power is to be got from Gersoppa Falls. The Installations meet the urban and rural requirements in Power of Bangalore and Mysore and increasing circles of villages. What is remarkable is the correlated series of making electrical goods in Mysore State to cope with its electrical expansion: porcelain cleats; electrical bulbs; glass (through Ogale); small electro-motor parts, etc. Forest Wood is treated for Posts and Pylons with Creosote obtained as by-product in the making of charcoal for the great Bhadravati Iron and Steel Works. Chemical industries are springing up for fuller utilization of by-products. Paper is made at Bhadravati. The Sugar Factory at Mandya is correlated with the sugarcane and the wet acres of Krishnaraja Sagar Dam. The near future may witness Mysore Aluminium and Mysore Silk built up by Science and not propped up by Tariff Walls.

21. 1. *Effect on life*.—Their effect on activities of life is striking. Already, in Mysore, Electricity pumps water for irrigation, works rural industries; it lights the streets and the cottages, and runs the radio. Mysore is coming to every villager. With amenities thus provided and the Ruralization of Urban occupations, at the same time that town life is costly, the villager may after all stick to his village, resisting the spell cast upon him by Town. Here is a Harbinger of the Future.

21. 2. *Isolation outlook going out*.—The villager is rapidly losing not only his Physical Isolation but the Isolation-Outlook. The old simple, self-sufficient and contented life of the village is enlarged and made fuller under modern conditions. Should this prevail, it may retard the Town-ward migrations of people.

22. 1. *Occupations*.—Occupations in Static India have reached a stationary level. But in Dynamic Geography, they are subject to continual change. With every advance of knowledge and activity in the World, India cannot help undergoing corresponding changes.

22. 2. *World Progress—on Indian production*.—India furnishes the most striking examples of Dynamic Geography, in

the consequences that have resulted to her Indigo, Sugar and Cotton, through the changes wrought by the spirit of man working upon matter. From early times until the nineties of the last century, Indigo was one of the principal sources of India's Wealth. The German Chemist in his laboratory learnt to produce cheap Aniline (Al + nil = The Indigo) colours from Coal Tar; and Germany has driven out Indian Indigo from the Indian market itself which now absorbs crores worth of German Dyes. Sugar Beet, also perfected by Germany, beats the richer yielding Sugarcane; Java, producing and marketing Cane-Sugar, supplies India, too (now, only in part). Cotton goods come from abroad to India which, till 70 years ago, used to send them abroad.

22. 3. *Village artisans*.—As if there has been little change in the world, the old time artisans of the village—the carpenter, blacksmith, goldsmith, weaver, potter, etc.—ply their precarious craft with many, many ups and downs.

22. 4. *Industrial Revolution*.—The situation is like that which arose in England upon the establishment of Industrial Revolution. Large numbers in particular industries were thrown out of work but they were re-absorbed in the expansion of Workshops and Factories that followed the first burst, which took the world by surprise. On account of being the first, Britain became the workshop of the world. But the Unemployment due to one machine doing the work of tens of people fell upon the countries where the British marketed their output, of which India is one. The men thus thrown out of employment in India have not yet been re-absorbed in new occupations, as happened in England. The old occupations are gone and no new ones have taken their place. Even the expansion of factories in India has only increased, and not diminished, the process of throwing out the village spinner and weaver, so long as the factory output is only for the Indian Market. These remarks refer to the textiles in cotton and wool, which are the leading industries of India. The case is otherwise with other major industries—such as railway workshops; iron and steel Works; leather and paper factories.

23. *Industries*.—To meet the demands of the great market of India, Western modes of Production are copied; factories have been established and are springing up for Textiles in Bombay, Ahmedabad, Sholapur, Cawnpur, Calcutta, Howrah, Coimbatore, Madras; Railway workshops in Bombay, Lahore, Jamalpur, Perambur, Golden Rock, Asansol; Iron works at Bhadravati and Jamshedpur

and so on. But these provide occupation for only a very small percentage of the population and not quite commensurate with its growth.

24. *Cement*.—Cement is the first and only industry to achieve self-sufficiency for India, taking advantage of Post-war conditions and making use of materials all of which abound in India. And it is sold cheaply, too, thanks to the competition of the Dalmias with the Dinshaw Combine (Oct. 1938).

25. 1. *Mines*.—Coal mining is ill-organized and not all of the mines are flourishing; but it employs many hands. Manganese ore is a principal export at Vizagapatam; Nellore and Hazaribagh mine mica; Gold-mining in Kolar is a wholly European enterprise. As for potential mineral wealth,—already, in 1910, Sir Molesworth spoke of its self-sufficiency in the Indian Empire. The Hammer of the Geologist has picked, since then, many an other mine and mineral; and, in the light of such finds, he can make the same affirmation of it, today, even after the present Separation of Burma from it. Furthermore, India is said to be the sink of metals; and, as is well-known, it is India's Hoarded Gold that has rallied the British Sterling during this decade when it fell off the Gold Standard.

25. 2. *Tanning*.—The tanning of Hides and Skins is done as in the olden time (even at that, the oil-tanning has gone out of use). There is, therefore, a virgin field lying open in the making of High-Class Tanning and Finished Leather goods.

26. 1. *Flow of Capital into India*.—Under the Protectionist Policy of the Indians that are gaining Political Power, there may well be a flow of capital, more than ever, from Abroad into India, with her cheap and long-houred labour, despite sporadic strikes, e.g., Dunlop; Lux; Bata; Wimco; Imperial Tobacco.

26. 2. *Gandhiji's Emphasis on human values*.—The Gandhian epoch emphasizes the value of human things and would rescue man from being swamped by machine. But it has not made headway: the Factory is winning.

27. *The Internal Trade*.—The Internal Trade of India is all-important. It is estimated at fifteen times the External Trade and is capable of great expansion. It may be confidently expected that, with increasing facilities for Yields and of Transport, more occupations will be found and more mouths fed.

28. 1. *Agriculture*.—The chief occupations remain therefore centred round agriculture; more and more, there may develop

dependent industries engaging many hands. The entrepreneur for them is yet to find his place. At the present time, the urban youth or the urbanized villager, willing to turn his hand to industry but disdaining rural toil, enterprises to produce urban goods as they may be called in India, soaps, candles, toilet articles, etc., in competition with Germany, Japan, France and England. Land finds no place in his thoughts.

28. 2. *Disequilibrium by Political action.*—Even in agriculture, world forces are at work that may disturb the disequilibrium still further. India pays England her dues not by selling all her goods to England but by selling largely to other countries of the world and paying from out of such receipts. Economic Nationalism, Ottawa Preference, Barter Systems and Tariff Walls have each its reaction upon Indian agriculture and prosperity.

28. 3. *Disequilibrium by New Producing-countries.*—Secondly, the produce monopolies (absolute and real or virtual by reason of quantity) will be destroyed in the future. Already, jute has been successfully grown in Africa by Indians taken thither, and in a decade African jute will cut Bengal jute. Cotton is a necessity for War as well as Peace; and Soviet Ferghana, under the Five-Year Plan yielding excellent cotton, has been linked to the Central Asian Railway and commands the West Asian markets, which were once supplied by Bombay. Italy is to raise cotton in Abyssinia and Germany pants for similar lands. British Africa has been growing cotton successfully.

28. 4. *Disequilibrium by new Production in India.*—Thirdly, the disequilibrium will be accelerated by large extensions of production in India herself. Among the great wheat and cotton areas are the snow-fed Punjab, and the rain-fed Central Provinces and Berars. Sind under Sukkur Barrage will yield within a decade wheat and cotton equal to those of Egypt in quality and quantity. That is bound to cause a great dislocation in India herself as well as foreign markets and the internal competition may push the rain-fed C.P. and Berars to the wall.

29. 1. *Caste and Occupations.*—In Static India, occupations have followed caste (in the larger sense); in the future, caste will follow occupations. The Great War has been a great solvent, and has forced the pace. Caste has fitted itself into the variety of occupations and into different parts of the same occupation and vice-versa.

29. 2. *Specialized occupations.*—Since the division of occupations in India as a matter of fact has been by caste, each caste plays

its specific part in Indian Economy as a whole. For example, the semi-nomadic Thoru caste do pioneer work making clearances at the confines of the Terai; and cultivate the patches; upon such lands, other castes of settled life settle shortly after; and the Thoru leaving them goes farther into fresh Terai; and so on. A similar progression of castes happens at the Doab where the peneplains are extensive, 20 to 25 miles broad at places, and clothed with rank jungle vegetation. Likewise, in Bombay, the British may lead in, the motor parts trade; the Parsi comes up followed by the Moslem and then by the caste Hindu; and finally comes the Marwari, with whom none can compete: he cuts his margin so fine.

29. 3. *Specialized even in the same caste.*—A man of one occupation will not take up that of another: 'The palanquin bearer would not tie the calf; 'The potter would not serve for barber'. Every European in India can speak to this from his domestic service, where a servant of a certain designation will not do the duties of another—even though all may be of a caste and the work unskilled. (Cf. *Chhatra-ka-Naukari*—it is not within the bond for a servant engaged to bear umbrella to lift up a falling child).

29. 4. *Man finds his level.*—Thus in India a man, enabled to find his level, his occupation and his work, is at it with rigidity if he can, under caste-forming tendency.

29. 5. *Parsi creates new occupations.*—Turning to the casteless caste: Small in numbers, the great Parsi community have been pioneers of Industrial Progress, and latterly, of Finance. Their benefactions and munificence are well known. By their high education and traditional instincts of commerce, and freedom to go abroad, they have been the first to see the possibilities of new things and to seize the opportunity as Captains of Industry. They have been the pioneers of Mills in India, capturing the Levant and China markets (both of which India has lost); of Western Hotels in India (the Taj Mahal Hotel); Iron Works in India (Jamshedpur); Aviation in India (Tata's); Cinemas (Madan); Safe-making (Godrej and Boyce), etc. Sir Jamshed Jeejeebhoy, the Jehangirs, the Tatas, the Petits, the Camas, the Wadias, Dadabhoy Naoroji, Pherozeshah Mehta and Wacha are but a few names out of those Parsis that have enriched India. The last three are household words in Indian Politics.

29. 6. *Parsi's Service to India.*—To find new occupations in Modern India, to show the way by their exertions and example and to be munificent with their earnings—that has been the

service of the Parsis to India. No other community in India has covered itself with greater glory than this small Parsi community who claim no special privileges.

30. 1. *Selection by each Province made from British Examples.*—It is very remarkable that in the exchange of thoughts and ideas due to the British and Indians coming together, the attractions of each province have been to those aspects and sides of the British in India, which correspond to its own peculiar bent.

30. 2. *By Bombay.*—Bombay, devoted to Industries and Commerce, has been impressed with the British merchant, is close on his heels, and runs him hard.

30. 3. *By Mahrattas.*—The Mahratta, with memories of having been the last great Ruler of India, rises equal to the British in Diplomacy and Politics and the Art of Ruling.

30. 4. *By Madras.*—Madras, keen upon things intellectual, is impressed with the British Scholar and Ruler, and has turned out Scholars and Statesmen.

30. 5. *By Bengal.*—Dynamic Bengal, her thoughts and creative power turned upon politics, society and religion, has been impressed with British leaders of them, and has created New Faiths, and Modern Indian Politics and Society. Bengal is the laboratory of Politics in India and has given the lead in Science.

Such tendencies forcibly bring out Regional peculiarities.

30. 6. *By Railways.*—Likewise, the Railway Administrations, though run by the British, display similar regional differences.

31. 1. *Cultural Contacts.*—Geography and History show that different peoples cannot long live together side by side without their influencing one another in the several walks of life; only, the influence comes out visibly on the surface of each according to its degrees of susceptibility.

31. 2. *Hindu and Moslem.*—The Moslem and the Hindu have been living for centuries not as two nations but alongside each other in the same town and village. The influence of Islam on Indian culture has been notable, not only in Religion and Politics, but also in Painting and Architecture, in Social Manners and Customs, in Language and Literature.

32. 1. *Painting.*—Hindu and Buddhist Schools of Painting have been followed by the Rajput. And the Moslem School, at

first deriving from Persia, shows an Indian evolution in strength of drawing and treatment of atmosphere and composition, as well as in differences of Symbolism and Realism. Amarendra Nath Tagore has founded the Bengal School while new schools are forming, guided by the Late E. B. Havel, Messrs. Percy Brown, Gladston Solomon, and Yazdani.

32. 2. *Architecture.*—In Architecture, the Hindu and the Buddhist have attained pre-eminence in Temple building which may be seen in the Geographical diffusions from Kabul (the pillar; Bamiyan) to Indo-China (Angkor-Vat); from Java (Borobudur, Prambanam) to Japan (the Toru, for example). And from the Hindu Kush, that influence travelled Westward into Persia and Asia Minor.

32. 3. *Hindu Remains.*—In Sculptures, and treatment of figures of animal and plant life and arabesques, in gates and pillars, towers, adornment of capitals of buildings, a continuity may be traced from Gandhara under Greek Influence to Mathura, Amaravati, Barhut, to the rock-caves of Ajanta and Ellora, the Rathes of Mahabali-puram, the Chalukya bejewelled Star-pagodas, the Vijayanagar Temples and Towers.

32. 4. *Moslem Remains.*—Moslem Greatness is writ large in Sikandra and Fatehpur Sikri, the Taj Mahal and Pearl Mosque, Jumma Musjid of Delhi (and its cities in ruins) Badshahi Mosque of Lahore, Goli Gombaz of Bijapur, the forts of Agra and Delhi, the Kutub Minar, etc.

32. 5. *Blended influences.*—The Indian Moslem buildings of India and Central Asia are interesting blends. Those of Agra and Delhi are modelled in shape and form, upon Samarkand and Bokhara, to which, the Great Timur took as his booty from India fifty thousand workmen from Delhi and which he adorned through them.

32. 6. *British Buildings.*—British India, building under the utilitarian philosophy of XIX century, has to its credit not these but Barracks, the Thana, Cooly Lines and Factory and Cutcherry. The Victoria Memorial of Calcutta is Curzon's attempt to make up for the omission of ornamental buildings.

33. 1. *Dwelling Place.*—The evolution of the dwelling place, which, in the nature of things, responds definitely to regional geography, has not yet been studied and leaves a gap to be filled by geographers. The modern influence is everywhere visible not only

in the wide choice of material but in the style itself ; even so, there is a great uniformity in the hut and cottage, characteristic of places and regions.

33. 2. *Mitigation of Heat.*—It is very hot in the hot Season. The Seista, that noon-tide pause in the day's rhythm, is the common Indian's device against heat, save where he is in office under the eye of the master. In building for habitation, it is a common design in India to have less light and more air ; to have cool currents of air.

33. 3. *Mogul Palace.*—The Mogul in building his Palace designed it to mitigate the heat of the sun ;—the long wall to break the current of air ; the garden ; the water-channel and the playing fountain trained into the inner court, too, for inner apartments ; the long verandah ; the thick walls and double walls to retain the cooled air ; and the Punkah to keep it in motion are his well-known devices.

33. 4. *British Bungalows.*—What was possible only to Princes has been available to the ordinary Britisher in India with whom the Solar Hat, the Lounge Chair and the Bungalow are associated. The Bungalow (so called after Bengal by the Portuguese) is built, so as to obtain cool currents of air, with long verandahs deep and cool, the air being passed through water-sprayed Khus-Khus curtains by the Punkah-puller (now being displaced by the Electric fan or Jost Fan). With the coming of air-conditioning, yet further stage is reached in comfort.

33. 5. *Town-Planning.*—Town-planning has a long history in India. Mohenjodaro of 3000 B.C. shows appreciation of Sanitary Science which in modern Europe dates from Chadwick's work in England in the forties of XIX century. The Town-planning of Conjeeveram and Srirangam, also indigenous evolutions, has received Dr. Patrick Geddes' esteem. Towns of Modern India are planned entirely by the British. New Delhi and Dacca (Ramna) are examples. Taxila and Nalanda are ancient university Towns whose ruins show thought and plan.

33. 6. *Modern Extensions of old Towns.*—Every old town provides itself with new Extensions on modern lines. Modern Mysore and Lucknow are beautiful extensions.

33. 7. *British Cantonment.*—While several old towns in Pre-British India are only tented camps made permanent, the British

cantonment is a new feature ; and the British segregate and build these towns as a series of Bungalows on long lines.

34. *Difference : Britain and India.*—The difference between Chowringhee and Chitpur (both in Calcutta), said Tagore Babu once, is the difference between Britain and India, between the community service and outlook of the one and the other.

35. *Society.*—In Social manners and customs, there has been an evolution of a common code of manners, graces, and courtesies of life, which is commonly observed.

36. *Non-religious matters.*—On the non-religious sides, Moslems and Hindus lead a common life in many places ; a whole treatise has been written of late by Dr. Hamid Ali, M.A., LL.D., Barrister, Madras, on the Non-Islamic usages in non-religious matters among certain Islamic folks in India.

37. 1. *Music.*—Music is an art where Moslems and Hindus have attained unity. The great Akbar himself used to be enchanted by the divine art of Tan Sen. Indian airs and melodies soften the stern warriors of Afghan valleys and the Hindu Kush. South India has perfected its Music of Ragas ; and that is the common heritage of Telugus and Kannadigas, Tamils and Malayees. North India has evolved a similar perfection.

37. 2. *British Music.*—In the sphere of music, the British have nothing in common with Indians. Under British influence, Orchestra is coming into vogue ; and British Bands and Bagpipes often play at Indian festive occasions.

38. 1. *Hindustani.*—Hindustani developed as a medium for the intercourse of two armed camps (Urdu=camp, same as the word, Horde). The British also have contributed to its growth. Despite the controversies over vocabulary and script (though all the scripts are foreign to India), the language understood by the largest numbers in India has a great future.

38. 2. *Indian Literature.*—That Literature has both Hindu and Moslem writers ; the late Sir Mahomed Iqbal was one of the foremost Poets. Although there are fifteen Indian literary languages, there is a large body of common thought and theme underlying them all. English Literature, acting upon Indian Languages, has made their Modern Prose anew and given them Modern Outlook.

39. 1. *Indian Reactions to the British.*—The British and the Indians live apart in India; but there are mutual reactions all the same. Armoured in the triple brass of caste (in the larger sense)—Marriage, Food, and Occupations—the Indian may think himself untouched by foreign influences; but he has been responding to them, inwardly, all the while. The Britisher in India stays as Ruler but he is regarded also as the representative of the multifaceted and highly complex Western Civilization; and Modern Ideas and Ideals have filtered to the untravelled Indian through one or other of such facets. To modernize after the European mode is, perhaps, a world impulse that is being witnessed from Istambul to Samarkand; but the pulsations of new life in India are due to the symbiotic life with Britain.

39. 2. *Type to Type.*—Different types of the British have come to India and have created corresponding Indian types.

39. 3. *Ruler.*—The Ruling Briton, the I.C.S., and other officers, took up the then existing system of administration as moulded by Hindu, Moslem, and Mahratta, and made it efficient; so that in many districts, the courts, laws, and institutions are wholly British but administered by Indians entirely, without a drop of British Blood being found necessary.

39. 4. *Teacher.*—The early teachers of Letters and Science were British, and so well did they do their work that Macaulay, were he alive, would rejoice that his hopes were getting fulfilled in that India could flaunt already five Fellows of the Royal Society and two persons crowned with Nobel Laureate (Tagore and Raman), an honour to which Asia from Turkey to Japan and Africa from Cape to Cairo have not been called as yet.

39. 5. *Soldier.*—The British N.C.O. has drilled the Indian Sepoy to equality with his British comrade in all respects except food, uniform, and pay.

39. 6. *Business-man.*—Setting up in business, the Britisher, though working for his own hand, has shown how to organize business, erect factories and run Banks, build railroads and direct shipping; and the lessons of his success have been by no means lost upon vigilant Bombay in particular, and India in general.

39. 7. *Missionary.*—The British Missionary has stimulated Spiritual India to canalize its humane emotions so as to render acts of Social Service as practised in the West and adapt the

39. 8. *The Professional.*—The British Doctor and Scientist, Engineer and Lawyer, successfully practising their lucrative professions in India, have set up high standards of *honour* as well as *efficiency*; and they are the accepted standard for their Indian brethren.

39. 9. *The Planter.*—The British Planter has triumphed against Nature; but the conditions of his success are beset with too many difficulties for Indians to follow, or compete with, him. The Epic of the Tea Garden has scarcely been told. To 'open out' a tea garden means to go out into the wild jungle, making a working team of heterogeneous hundreds of wild and aboriginal tribes and hillmen; to be remote for months from the Doctor and from civilized society of their own kind; and to take the risks of being cut off in one's prime by blackwater fever and other diseases which make no difference whatever between European and Indian. Here is a good example of Dynamic Geography showing what can be achieved under Modern Conditions.

39. 10. *Companies.*—Great Companies like the Imperial Tobacco Co. show by their operations at Guntur how the land there may, by its being made to yield its best, sustain not only the ryot but a highly paid staff for technical skill and supervision. That is an object lesson to India. Similarly, Spencer's at Dindigul, famous for Cheroots. Such examples show what room there is for development in India even in agricultural industry.

40. 1. *Anglo-Indians.*—The Anglo-Indians have also been an object-lesson. When Indians were not to be had, they were the Teachers, Higher Clerks, and Doctors and Nurses; and even now they prove their worth, by Discipline and Efficiency, as Police Sergeants, Telegraphists, Wireless Operators, and in Railway Service.

40. 2. *Other Europeans.*—Other Europeans have brought to bear the components of their civilization on Indian Life. Especially so are the Missionaries of Europe and America, and the Salvation Army.

40. 3. *German Technicians.*—And one of the greatest factors in building up Indian Industry to-day is that German Technicians are available, ready to work under Indians and to teach Indians, and make up, with their technical knowledge and skill, the want of Indian Technicians and necessary Knowledge—as at Bhadravati.

40. 4. *Kind of Westerners Received.*—In the XVIII Century, it was the Soldier of Fortune of the West (De Boigne, for example,

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the prototype of Major Gahagan) that was welcome; in XIX, it was the Businessman; in XX, the Technician of the West is in requisition. Each age chooses according to its needs.

41. 1. *British Institutions.*—The British have brought with them their Institutions into India.

41. 2. *Club, etc.*—Besides the Club, which is as distinctive as exclusive, there are Gymkhanas, Race-courses, Golf-links, Yacht Clubs, Regattas, Fig-sticking Clubs, Tent Clubs, etc.

41. 3. *Sports and Games: Hockey, Cricket, Soccer, etc.*—Sports and Games, and Exercises to keep a man fit, even such as are peculiarly British, have gained ground among Indians. In Hockey, India with the Wizards of the stick (Dhyan Chand and Rup Singh) has beaten the rest of the World in successive Olympics. In Cricket, individual excellence has been attained though not as yet the team spirit (as the last Vizzy Team to England showed when there was reversion to Indian conditions). In Football, the Mohan Bagan is the Arsenal of India. In Wrestling, Gama has an unbeaten record.

41. 4. *Indian Exercises.*—Indigenous Akharas have receded, coming out only on Moharam or Ganapati Festival; though they, especially with their Indian clubs and Leijums and sticks, swords and Dhand, have been spoken of as highly efficient.

41. 5. *Indian Contribution.*—The Polo, the Chess, and indirectly the Cards, are India's contribution to the world. Old time amusements like Hawking and Falconry (save Cock-fighting) are almost things of the past.

41. 6. *The Sporting Spirit.*—To play the game in the right sporting spirit is one of the hopeful and unifying agencies of the future.

41. 7. *Similarly Science is unifying.*—Education in Science, which recognizes no racial or communal, or even provincial or religious boundaries, is another cementing factor in New India. Science and Sports open a vista of hope for India, bitten as she is all over with many a virulent poison.

42. *British Reaction to India.*—On the British side, Life is not without its tolls to pay. The only European in the heart of a forest, the Britisher goes through the rites of Tea-drinking as at Home, under dread of losing form. The Nabob of olden time, also under similar dread, drank his magnums and wore his broadcloth in broiling heat, at the same time as he adopted the Hubble-

bubble and mulligatawny and (Becky Sharp's) green chilies. The Jos Sedleys and Touchwoods are gone, even the Colonels Mannering and Colonels Newcome. But in spite of cheap and frequent passage home, many a man has to sacrifice his Family Life and Footing in English Society at the call of Imperial Service. They are, in the necessities of their position in India, further subject to the Twin Process of Isolation so as not to be mixed up in Indian Society and of Caste in disdaining humble toil. There must be black sheep even in the white flock, and not all that came to India have been white. But on the whole, the white have outnumbered the black.

43. 1. *Any Britisher 'Does.'*—It is a remarkable fact that any ordinary man of England could come to India and carry on, to the profit of both countries. The disparity between Mediævalism and Modernity, the Cultural Lag that still lies between, accounts for it but partly. It is to the spiritual side of man to which that should be ascribed, though they came for wages, worked for wages, and took their wages. A shoemaker, and a bookseller, an incomplete printer and a watchmaker (Carey, Marshman, Ward, Hare) urged by missionary zeal and social welfare learnt and mastered Sanskrit, Persian, Hindustani, Bengali, wrote the grammar, provided those languages with the first printed literature, setting up Printing Press and cutting types, learning that Trade, when they felt the need for it, by their own unaided efforts here (which they had not learnt at Home). South Indian languages owe a similar debt to foreign missionaries like Beschi, Fabricius, Rothler, Kittel, etc. Science is indebted to Roxburgh, Drury, Day. Ross and Haffkine have won world fame by their work in India. The science of Modern Geography begins with Rennel's Hydrographic Survey of Indostan, more than 150 years ago.

43. 2. *Nicholson.*—Sir Frederick Nicholson I.C.S. (Madras) was notably full of the Geography of his charge from his salad years up. As early as 1892, he set out the Land Mortgage Bank Scheme, as a means of relieving Rural Debt. He was the author of 'Land Revenue Policy' issued by Lord Curzon's Government. Upon retirement, he settled in Kotagiri and worked, harder than ever before, for Indian Ryots. His administrative experience stood him in good stead, and he looked to the business side as well. He was the father of the Co-operative Movement in India. He travelled to Japan for study; and had the Fisheries Department, Madras, constituted, to increase the available Food supply; and produce fish guano and fish oil. He brought back also ideas on Elementary Education. He had the Kerala Soap Factory founded and the

Canning factory established at Calicut and a factory for Jam at Coonoor for instructional purposes. His last efforts were directed to increasing fruit production by carrying on propaganda to exhort everyone to plant at least one fruit-tree a year. At the same time, he was doing his bit at the municipality. All this he did in his advancing years. He loved the land he lived in and worked in; and laid down his bones there. What a noble and inspiring record! Every province can show such salt of the earth.

43. 3. *Chatterton*.—Sir Alfred Chatterton could not rest content with the routine duties of Engineering Service, Madras. He saw the room there was for the development of small industries and made Government do experimental work in Chrome Leather and Aluminium, and had those Works started, the first of any in India. He had the fly shuttle brought in to improve Handloom Weaving. Passing over to Mysore, he helped in the founding of Sandalwood Oil Industry there. His career shows what one man with the Will can do, and make new openings, even when such things are not within his own skill or within his bond.

43. 4. *Hailey*.—Lord Hailey has stated how in the junior years of service he obtained a biggish farm to carry out agricultural experiments, at his own cost; and casting about for manager, secured the services of a retired Tashildar whose agricultural qualifications like his own were nil. But zeal and honesty more than made up for want of knowledge: and Sargodha Farm served the Punjab as second only to Lyallpur.

43. 5. *Brayne, Calvert*.—The work of the Socrates in an Indian village at Gurgaon is watched all over India with interest. Sir Calvert has carved a name for himself in India by his work in Co-operative Societies in the Punjab.

43. 6. *Cotton, Cautley*.—By the genius of Sir Arthur Cotton and of Sir Proby Cautley, who had a geographical vision of Irrigation and started the Works, India has the largest system of Irrigation in the World.

44. 1. *Seshadri Ayyar*.—Happily, even in the field of Industry there have been Indian Leaders. We may give a few examples. Rising from clerkship in Mysore to be its Dewan, Sir Seshadri Ayyar, a born Engineer and man of action, electrified by the harnessing of the Niagara, at once set about picking his way through electrical knowledge; explored the Falls of Sivasamudram; and, in the teeth of expert opinion, installed the first Hydro-Electrical

Works in India. His mind full of the Dynamic Geography of Mysore, he built the Marikanave Project and had many an other scheme to put through.

44. 2. *Visveswarayya*.—Sir Visveswarayya, a certificated Engineer, has to his credit Krishnaraja Sagar Project and the Phadravati Iron Works. His bible is the Statesman's Year Book and the Abstracts of Indian Statistics. Best understood in U.S.A. and highly esteemed in Industrial Bombay, he has his plans of Reconstructing India and his latest work is to avert the Mahanadi floods; and to make the Car in India.

44. 3. *J. N. Tata*.—India has not produced in the sixty years past a greater name in Industry and Patriotic Philanthropy than Sir J. N. Tata. His Dynamical Geography it was that gave him expansive thoughts. The story is told of how observing from the windows of his Railway Train the long lake at Sitabaldi, his swift mind seized on its potentialities; and he had the Empress Mills built at Nagpur, the largest textiles in India for many a long day. His mantle fell on Sir Dorab Tata and Sir Ratan Tata who have built Jamshedpur and the Tata Hydros, and pioneer Civil aviation.

44. 4. *Harkishen Lal*.—Opinions may be divided about the late Lala Harkishen Lal's misfortunes, but there can be no doubt about the service he rendered to the Punjab and Upper India. While eating his dinners in London, the Dynamic Geography of the Punjab was always before his eyes. While there, he studied the Banking System of Germany and England; and on his return, he built up the People's Bank with moneys obtained on English banking system and Investments on the German model. He introduced Big Industries and Big Banking into the Punjab. Though his days ended in thunder-storms, the tribute paid to his work by the present Premier of the Punjab is as just as true.

44. 5. *Fazli Husain; Ashu Babu; Mehta*.—The late Sir Fazli Husain shares with the late Sir Pherozeshah Mehta and the late Sir Ashutosh Mukherji the fame of being Indians, who combined in the highest degree executive talent with far-sighted Statesmanship.

44. 6. *Mookerjee; Ganga Ram; P. C. Ray*.—Romantic was the career of the late Sir R. N. Mookerjee of Bengal; as also of the late Sir Ganga Ram of Lahore; and Sir P. C. Ray among scientists, with the dedicated life of a Rishi of old, produces Chemicals and Chemists—both. Several of his pupils have filled the Science Congress Chair.

44. 7. *Political Leaders*.—Indian Politics has attained distinction with its galaxy of brilliant Leaders and Statesmen—Chittaranjan Das and the Nehrus; Bullabhai, Jinnah and Azad (to mention only a few recent names) as well as Malavyaji and Gandhiji.

45. 1. *Room for Improvement*.—A dispassionate examination from the standpoint of Dynamic Geography of India discloses that the Wealth of India in Agriculture, Forestry, Fishery, etc., may be multiplied and applied to the reduction of the Appalling Poverty of Indians. The more one observes and examines, the more one is confirmed in the belief that the Utilization of things in India is far from complete; that the disabilities are more human than physical.

45. 2. *Dayalbhag Experiment*.—Under the impulsion of religious background, the Dayalbhag colony produces marketable articles of excellence unobtained before (as certified to by Successive Viceroys). Here, Religion has put down the disturbing elements, furnished the cohesion and the discipline, and has ensured the quality. Religion has furnished the central authority—but all the same an authority that is obeyed.

45. 3. *Gandhiji's Khadi*.—Under the impulsion of Gandhiji's voice—the call to political as some say but humanitarian service as Gandhiji has it—Khadi has given a food value to idle hands, wasted hours, and hungry mouths, millions in number.

45. 4. *Room for capitalist*.—What these do, the capitalist may do under proper conditions, although he may put out his money, out of no philanthropic motive.

46. 1. *Discordant elements holding together*.—For, the India of today is Nature's cauldron in which are gathered all the ingredients of a great civilization. The Hindu conserves the virtues of Ancient Civilization; the Muslim cherishes the glories of the Middle Ages; and the Britisher represents the power of the Modern Period. Varieties of races, religions, and cultures, caste and colour, as divergent as may be, are pent up within the Indian Frontiers. They live side by side, the lion by the lamb, in amity and peace. Such was the aspiration of the ancient sages (Siddhashrama) and such is the proud achievement of Pax Britannica.

46. 2. *The Law of the Jungle*.—Discordant elements, the hyænas of towns, are, however, ever ready to break the King's Peace and set up the Law of the Jungle; but the common sense of all keeps a constant vigil. There is nothing worth having, not even Peace, unless it is to be fought for.

46. 3. *India in Transition*.—India is in Transition, passing from the old to the new; from the mediæval to the modern; from one culture to another. It is inevitable that in this period the divergences should be multitudinous and not harmoniously graded. The grotesque and the picturesque may be cheek by jowl; the incongruent, obtrusive; the contrasts and confusions, striking.

46. 4. *Old ties loosened*.—In this transitory period, the old ties have been dissolving (except for persistence of family life) and new ties have not yet been formed. Modern Western Life is conceived of as an emphasis on Individualism and Hedonism, each unto himself and each to put his own ease and comfort before other things, and drink life to the lees.

46. 5. *True Greatness of the West*.—Little understood is the fact—because it is not so apparent—that Western Civilization has its spiritual side, has its roots in Truth of Knowledge and Belief and in the principles of Self-Help and Self-Sacrifice, even where the Dedication may be merely to Nationalism.

46. 6. *Deus ex machina for everything*.—Not seeing the West in its true light, Modern India may tend to look to *Deus ex machina*, always, for all things under the Sun. Accordingly, in the release from old bonds, the calls of Patriotism or Nationalism, of Politics or Religion, have a response—but in varying degrees, under the new conditions. Politics makes the largest appeal to the English-educated Indian.

46. 7. *Sects*.—Of course, there are, and will be, in India, as in any other country, persons exploiting the mob mind. Great Leaders have been springing up, obtaining large following; but the caste-forming spirit often makes each a sect.

46. 8. *Schisms*.—The fissiparous tendencies of Indian Life have been much noted, but even these seethings, breaking out on the surface as communal, provincial and linguistic jealousies and racial and religious antagonisms—those old familiar things—are but symptoms of new ferments at work making a better India.

PART III—CONCLUSION.

India has been awakening into Modernity through the Impact of Europe, the Connexion with Britain, and the Linkage with the World. The new forces permeate Cities and Towns; and, thanks to the Car and the Radio, they are penetrating Villages, where it is, that 80% of her teeming millions dwell. Of the leading features

of Static India, Isolation is gone (save only in World Politics ; and there it is complete) ; Self-Sufficiency is rudely shaken ; Caste is responsively adapting itself ; Cultural Lag alone has been slow to change, trailing, as it does, the Sense as well as the Memories of the Past. Even here, there is a stir of new life—this very Science Congress is a sign of it.

The leading agencies of the Metamorphosing now on, are both Foreign and Indian—Institutions, Societies, even Trading Companies ; communities, individuals, and men of all occupations. The Human Elements are active while the Physical are fairly constant. The Future will be the Integration of all the Changes going on both big and small.

The old Static Geography sees only the Pressure upon Land, the Appalling Poverty, etc., of an Improgressive India. The new Dynamic Geography can see the forces at work, and disengage the true causes from the false. It finds that the causes are not inherent but removable ; that man in India has fallen behind and is catching up : only, he has not, as yet, risen to the height of his opportunities.

At a given moment, geographical conditions are in equilibrium, but the equilibrium is of the Unstable kind. The Spirit of Man and its acquisition of strength through Creative Knowledge react upon his Place and his Work, bringing about constant change.

Here, in India, all the Cultures of the World meet, in all their variety and range ; and a great composite civilization is growing under the influence of them all. Therein will lie the diversity, richness, comprehensiveness and greatness of the Indian Civilization that is to be.

England is the Synthesis of Northern Europe, the United States is the Synthesis of All Europe. India is to be the Synthesis of the Whole World.

Dynamic Problems of Geographical Reconnaissance in India

By

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During some years of absence from India, experience has shown me how much geographical research can be done from the library chair or rather the mapping table. Of the official publications the topographical and atlas maps of the Survey of India come first for us. These make it possible to perceive much of the character of the physical and natural environment. One can thus note and generalise the true location of the statistical data of agriculture, population density and the like, and so proceed to rebuild the statistical fragments into a scheme which increasingly approaches the geographical synthesis, the geographical truth we seek. And for those who would grasp what is always known, the dry facts of the official surveys and data are constantly illuminated by written reports, memoirs and studies of high standard. But for those who would go further, and who seek to add their quota to the understanding of India's geography it is the permanent and relatively unchanging features which can be re-mapped, re-classified and re-interpreted. I refer to facts of relief for instance or to the broader distributions of vegetation. The same is true for changing facts recorded at a given date, such as the position of a shifting river, the boundary of cultivation and habitation at the time of survey, or the statistics of population density at a particular census date. It is when we come to what I shall call "the dynamic" aspects—to facts of change and their character, and to processes in course of actual, observable evolution—that field observation becomes increasingly necessary. And if we seek to understand in order to re-plan, if our "survey is for service," then it is all the more needful constantly to renew in the field direct contact with reality in life and change.

A year ago, Prof. A. G. Ogilvie outlined to this Congress a number of the problems, both static and dynamic, which lie before us and he indicated methods with which to deal with these.¹ To

1. A. G. Ogilvie, University of Edinburgh, *The Technique of Regional Geography*, with Special Reference to India. (I.S.C.A., Calcutta, 1938. Repr. in J. of the Madras Geogr. Assn. 1938. These notes having been written while on tour, there has been no opportunity of verifying or extending the references given.

this paper, to which I shall have occasion to refer again, I had the privilege of making certain contributions. Hence the following notes, made in the course of all too rapid tours in different regions of India, may be considered simply as a sequel to and commentary upon the succinct review of problems and methods outlined by Prof. Ogilvie. Along with Prof. Ogilvie's paper I wish to refer to the work on India of Jules Sion, in the *Géographie Universelle*.² For Prof. Sion's work on "the monsoon lands of Asia", is to be thought of not simply as an excellent explanatory account of India and the Far East, but—what is relevant to my purpose here—as a study full of questions to guide and to awaken the observer here in India. For while Sion was prevented from visiting India, he is himself an admirable field observer as both his earlier and later works have shown.³ Hence his writing upon India is full of suggestive enquiries for the field observer. These he has also set out in a note upon Indian population⁴ and in a short article in English upon method in Geography, with applications to India.⁵ The forthcoming work on India by Prof. Norbert Krebs of Berlin is one to which we look forward for an illustration of method from still another school.

Before we come to what, in this paper, I have called the "dynamic" aspects, it must be remembered how many of the "static" aspects remain to be analysed and classified. Relief is fundamental, and for most of India, we still await an explanatory description of the landforms of mountain and plateau. The character of the plains, of their deposition and partial re-dissection, awaits description and re-mapping—a matter of subtle relief but one vastly important for the understanding of the regional habitat from the Punjab to Bengal, and around the coasts of the peninsula. Again we require a map for the major regions, for the provinces of India distinguishing the areas mainly cleared for cultivation from the rest, forest or waste. The Survey of India commenced a "Ten-mile" Atlas⁶ but proceeded no further than a preliminary edition of Vol. I, Bengal and Assam. The scheme has gone no further, because of financial stringency and the smallness of a public educat-

2. J. Sion. *Asie des Moussons*, Vol. II, *Geographie universelle*, Paris, 1927.

3. J. Sion. *Les Paysans de la Normandie Orientale*, Paris (c. 1905); (in collaboration) *La Mediterranee*.....*Geographie Universelle*, Paris, c. 1935 et seq.

4. J. Sion. *La Population de L'Inde d'apres les derniers recensements*, *Annales de Geographie*, 1926.

5. *Calcutta Review*, 1926-27.

6. The "Ten Mile" Atlas, Vol. I, Assam and Eastern Bengal, Published by order of Brigadier E. A. Tandy, R.E., Calcutta, 1928. (Out of print).

ed to observe a countryside and to use maps. The need for such a survey is suggested by Mr. Yeats, the writer of the Census Report of Madras, 1931. I have myself sketched the boundaries of cleared lands and of waste with forests for the Chota Nagpur Plateau (Bihar) and for Orissa.⁷

If one tours in India, however, one realises that in detail this line dividing cultivation from waste is not static but dynamic, a moving battle line. For the cultivator is trying to extend his cultivated land at the expense of waste, in order to grow his crops, feed his crops, feed his family, and organise his life. Or the stage of extension may have ceased and he may be struggling not to extend but to maintain the clearance made by his forefathers, while owing to erosion of de-forested "Jungle," gravel and sand may be scattered over his fields (as along the foot of the Himalayas in the Punjab) actually pushing back the line of cultivable land. It may be added that the nature of forest, and its distinction from damaged or useless waste, is important. The

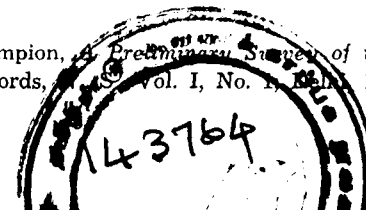


Meeting line of Cultivation and Waste.

"ideal" forest types of India have been succinctly described and mapped.....in a single well-illustrated volume;⁸ but in addi-

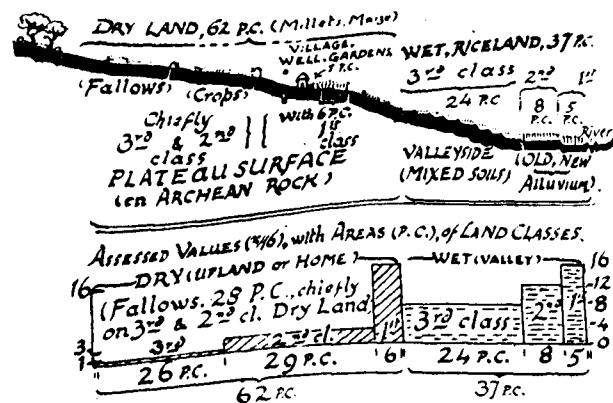
7. Arthur Geddes. India: (I) The Chota Nagpur Plateau and its Bordering Plains. *Congres International de Geographie*, Amsterdam 1938. Tome II, Sect. IIIc. *Geographie Coloniale: Question: Population et utilisation du sol*. Since this was done I have noted that the Road Map of Bihar and Orissa, on ten miles to inch scale, includes contours and forest (Patna and Bihar).

8. H. G. Champion, *A Preliminary Survey of the Forest Types of India* (Ind. Forest Records, Vol. I, No. 1, 1939).



tion to this, the Forest Department have noted "forests" for certain areas or provinces on large scale maps, with index maps which are of real use to the geographer. It should be possible readily to combine these and other data in an initial comparative survey of forest and of cultivation. Indeed a great deal of useful preliminary correlation can be achieved simply by placing two sets of data found side by side in the field. Such data are collected separately merely for the convenience of administration; but when they are so—as in the case of Agricultural or of "Forest" maps and data—it is essential to reassemble them in order to apprehend regional unities.

Closely connected both with relief and with the forest cover, at its removal, is the question of soil erosion. The peasants' cart-rut, and still more the road engineer's drain, may set agoing, in the torrential downpours of the monsoon, little waterfalls which, eating back, multiply themselves over field and jungle. The scour of the monsoon storms, so noticeable as one goes afield, is perhaps most striking of all from the air. The pattern of river and



Hazaribagh District: Chota Nagpur Plateau—Ideal cross-section of Valley.

tributary is frequently spoken of as "dendritic"; but the effects of headward erosion I have seen over miles of ruined countryside have made me think of giant claws, scouring away sown crops of pasture cover, soil and sub-soil. In this way slope deserves description not simply as a static fact. When related to rainfall, the degree of slope is of course indicative of latent energy which sets the rainwater in motion, scouring and denuding, to deposit gravel, sand or silt when the slope slackens. The indications of gullying given in the topographical maps are helpful. And when these are generalised on reduced scale mapped for an area such as the United Provinces, together with the relief—the terraces, sandy ridges and clayey hollows—of this portion of the Ganges plain,

they help to indicate the problems and difficulties of the cultivator.⁹

The importance of the rhythms of the seasons, and the annual rhythm of cultivation and kindred occupations was stressed last year by Prof. Ogilvie.¹⁰ The Indian examples he selected were, it will be remembered, of three types, in diagram form. The first shows vertically the area of crops for a region together with the normal seasonal duration for each crop (shown horizontally).¹¹ The latter was of course drawn in relation to the monthly scale of temperature and rainfall. Here I would only add that I accept the plea made to me by Dr. V. K. Badami, of Mysore, that for temperature the means of maxima and minima, rather than the ordinary monthly mean be used, wherever temperature is the critical factor. The same should no doubt apply for rainfall, but without overloading the diagram, of which the function is to summarise. The usefulness of such a diagram lies in showing the re-

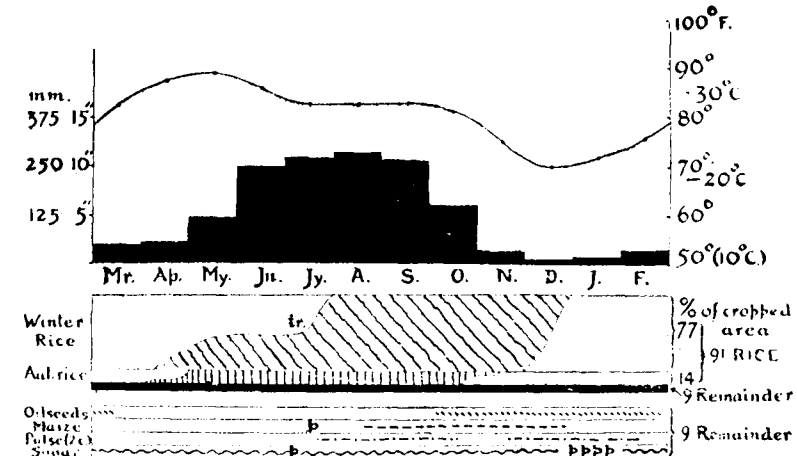


Diagram of the Annual Rhythm of Cultivation in Orissa (Balasore District) in relation to mean temperature and rainfall.

P—one ploughing; tr.—transplanting.

lative duration of crop and fallow according to area. It indicates too, if it does no more, the season of labour or of idleness. It is because of the widespread duration of a slack season in India that so much has been made of the *charka* and the need of finding employment for the villager. Surely stress should be laid not on getting the cultivator to spin which, after all, is the characteristic

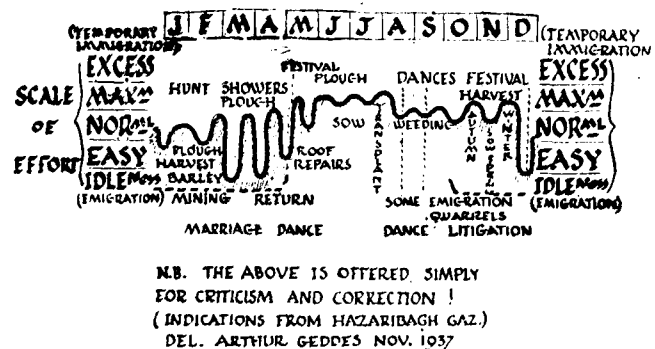
9. These features were generalised at Edinburgh University in collaboration with a student on a M. S. map of U.P. on 1 M. scale.

10. *op. cit.*

11. Amplified in two papers: A. Geddes, India (I) and (II) *op. cit.*

job of the "spinster" and the widow, but on helping him to carry on his proper work of cultivation throughout the year and similarly to employ his bullocks, which are an extension of his physical strength. There are of course two chief ways of tackling this agricultural problem. An ancient way, but one not yet fully mastered, is that of irrigation. Too often irrigation has proved successful in the first years and has been followed by damage thereafter because of over-irrigation and water-logging.¹² The other and complementary method is that of dry-farming, now being seriously studied.

This type of diagram, though it combines a crop area and crop season does not show the actual amount of human work performed with any precision. Hence the need for a second type of graph which should follow on from it and be its complement. This



Seasonal Rhythm and Effort—Northern Chota Nagpur Plateau.

was originally devised by Deffontaines,¹³ and his term,—*horizon de travail*,—may be translated as seasonal employment throughout the year. The term ergograph should certainly include this type of diagram. For its preparation, even if one is oneself prevented from making a long stay in the country, Settlement Reports give considerable data. And comparison of the monthly and annual labour bill per acre on a Government District Demonstration Farm collated with the customary practice on a ryot's holding (often detailed in District Manuals and Reports) should give fair accuracy. The Government Farm could give working hours per day, but Deffontaine's graded scale of effort is one a peasant could understand. Between the extremes of more work at harvest time

than the peasants of a region can manage without importing help, and (conversely). of so little to do that emigration is sought, are three grades: maximum, moderate, easy. A third type of diagram of annual rhythm can show seasonal migration.

There are many other points on which I should like to touch. One very interesting study is the homestead. The great French geographer Demangeon has said that the homestead, housing the cultivator's family, animals and crops and built for their need is almost "a living thing." The plan shows the peculiar relationship of the crops to the animals and of the family and household to their activities. In the interesting movement for village uplift, which has struck me greatly on my return to India, housing is important. And with increasing safety of life and property many changes are possible. Not merely are light and air and sanitation important, but daily work and (I should like to add) recurrent leisure. I think geography may endeavour not merely to consider the plan of the homestead as one finds it but to see, by comparison with varied types, how far the homestead plan can be bettered in view of existing, and potential, regional activities. This brings me on to the interesting question of the house itself, the family home. Now I think there is a certain lack of objectivity in many allusions to the joint family. How often is one told in India than in Europe there is separation of families, each individual European family living by itself, whereas the joint family system, is said to be the rule in India. It is added that modern life is breaking up the peasant joint family and causing a new state of things, the undue separation of families. In the first place my observations suggest that the joint family is not really characteristic of the ordinary peasant cultivators of India. It is certainly usual to find two grandparents, young parents and children living together. Quite often two brothers, certainly if one of them is still unmarried, may work the holding which was their father's. But the joint family on this restricted scale is a human institution not unknown in Europe and characteristic of peasants everywhere. It may not continue beyond one generation without renewed fission because it means giving up responsibility too long. But in most countries it is felt that the father of the family should have the farm in his hands, with the grandfather's advice to guide him and the direction of the unmarried sons. In India this direction is continued after marriage. One should realise that the joint family, on the really extensive scale known to the land-owning "middle classes" as even now in Bengal, is not usual among cultivators. The phenomenon is in the main restricted to a single class, to a single style of property. What

12. See for example the Irrigation Reports and Technical Papers for the Punjab (Bernard Wilsdon, Mackenzie Taylor and Others), or for Bombay (C. C. Inglis).

13. Deffontaines on the peasants of the Moyenne Garonne (Paris, recent).

is usual among cultivators is (1) a restricted amount of joint ownership over two (or three) generations (as just described) a condition still such as we find normally in Europe; and (2) a tendency for a couple of brothers to carry on together, after their father's death, in order not to break up the holding, again a feature also characteristic enough of old-fashioned peasant Europe wherever emigration to the towns has not predominated. Now the advantages to two (or more) brothers of holding together have always been offset by the advantages of independence. Modern life with its commercial, competitive marketing, is probably tending to greater individualism than in the past, but some desire for independence is no new thing. So let us get our facts clear and avoid sentimental generalisations. The Census of course is helpful. It gives the average number of the "commensal" family, of which the members share their meals, and this corresponds very closely to the European family of 4.5 to 5 members. But with this should be compared the numbers of those holding land together, a matter on which we shall expect to find data in the Settlement Reports. And as in each Report conditions are carefully compared with those at the preceding Settlement, they form an interesting record of contemporary change.

From consideration of the single house, we come to that of the village unit. Again the village plan must be related to village economy, present and also past, if known. The working ways of the village and the extent of co-operation or of hiring of labour are vitally interesting. Now the face of Europe has very greatly changed since the Agricultural Revolution which frequently brought about the break-up of a village wherever village homesteads were lightly built. They tended when they were re-built to be re-distributed on separate holdings as in Denmark.¹⁴ And as every one here knows who has been to Britain, isolated farms are common and in Scotland, the village is a rarity and a purely agricultural village is almost unknown: villages there are miniature towns with artisans and shopkeepers. Now what is at present happening to your villages? Will re-building of homesteads be done *in situ* or will there be an increase of dissemination? In the Central Bengal Delta, where population has actually diminished since 1871, (and before) the *math* or open rice land shows few homesteads; but in the teeming Eastern Delta the *math* is dotted with new homesteads. The commercialism of the nineteenth century overstressed the importance of Darwin's thesis that competition was a dominant

force in evolution. Complementary to it, indeed contrary to it, is 'mutual aid.' This conception of Kropotkin, who was not simply an idealist, but a keen observer of societies, plant, animal and human, is important today in scientific philosophy and in social progress. It plays its part in constructive efforts such as communal farming, and in the struggles for freedom so savagely retarded, so bitterly fought in Europe or in China. How might further co-operation affect our village and its plan? Are we only to expect an increasing break-up of socialised unit, or can we look forward to increasing re-socialisation of the village unit, with the Panchayet reinforced and co-operative organisation in full play. If so we are justified in considering the problem of the village, the village roads, fields and so on, in view of increasingly socialised units. For the danger of the most honest politician is that in preparing his programme he will unconsciously project his boyhood memories of his own village and region upon his whole province, or upon all India. Here again objective survey is required; and we geographers should be ready with our contribution, as these ideas are worked out, region by region.

Prof. Ogilvie has stressed the importance of population mapping,¹⁵ and I have endeavoured to apply this in plain and in plateau country.¹⁶ Here I need only point out that while density can be satisfactorily plotted from published census figures, given topographical maps, the accurate localisation of actual change is far more difficult without much more detailed statistics than are published. If statistics of population of villages for 1931 could be kept after 1941 instead of being destroyed, and embodied in well generalised maps of change, I believe that very significant conclusions could be obtained. In view of the burning interest in peninsular India in the question of "linguistic provinces", it may be well to mention certain related problems. The relationship of language, of religion, and of other criteria of culture, not only to each other but to economic distribution can undoubtedly be clarified by conscientious use of geographical method. In Southern India, at this time, when few regard the internal political boundaries of India as either economic, just or final, I was struck by the rarity of any discussion of possible economic provinces. The concept of the region, and even the word, is rarely met with. I have little doubt that, as the mapping of important distributions proceeds, without slavish adherence to existing political boundaries, geography can do much to guide the re-formation of her internal political frontiers.

15. A. G. Ogilvie, *op. cit.*

16. A. Geddes, *The Population of Bengal, a study in method*, *Geogr. Journal*, March 1937; and *India (I) and (II)*, *op. cit.* (Congrès International Geogr., 1938).

14. Question: *L'Habitat rural* (Congrès International de Géographie, 1932 and 1935).

Last of all we come to the city, of all geographical phenomena that in which the human factors are the most concentrated and the most dynamic. Since first I was engaged in town-planning work in India, the study of cities has been immensely facilitated by air photography. An air view of Calcutta brings out at a glance the areas of pukka buildings or of mud built quarters (*bastis*). And the improvement—or the devastation wrought by town-planning which has preceded geographical and socio-economic survey, instead of following upon it, can also be deciphered. This immensely simplifies the problem of preliminary urban reconnaissance. For on re-emerging from the labyrinth of streets and lanes, of homes, workshops and factories and fields, the elements of order can be located and collated. In this way the possibilities of economic and truly socialised planning can be ascertained. The studies of Indian cities found in town-planning reports are ready for the geographical compiler. I hope that if support is forthcoming a selection may be published from the pioneer Surveys and Reports on town-planning by Patrick Geddes.¹⁷ But no existing report is complete, and still less final. Hence the geographical method of study not only of the existing city and its site but also its situation in relation to its region and to neighbouring cities is required for better planning

Impressions of Lahore Science Congress, 1939

By

M. SUBRAMANIAM

On January 2, 1939, the Science Week of the Indian Science Congress Association was inaugurated at the University Buildings of Lahore by H. E. Sir Henry Craik, the Governor of the Punjab. Dr. J. C. Ghosh of Dacca, the President of the year, delivered the General Address, reviewing Science Progress in India. From the following day, the eleven sectional presidents gave their addresses to their several sections.

Geography has been made into a separate section permanently from this year; and Mr. N. Subrahmanyam, M.A., L.T., F.R.G.S., of Madras, this year's president, delivered his address to a throng of delegates from all sections and from various Provinces. The subject chosen was, "The Geographical Personality of India." The address met with warm approbation all round, for matter, form, and style. 'It is a comprehensive survey of India,' said some, 'It makes a new synthetic approach'; 'it is eloquent, brimming all over with sympathy,' said some high authorities. 'I never thought Geography can be so full of life and interest,' said many a delegate, upon hearing it read.

This new section of Geography was able to attract as many as twenty papers on various topics. Dr. Chatterjee of Calcutta led off with his Lecture on Ranchi, giving it, he said, in the true French manner as a series of slides with explanations in between. His next paper on Puri was similarly done. Mr. A. C. Bannerjee, also of Calcutta, read a paper on 'some of the markets of Calcutta.'

Mr. B. M. Tirunaranan of Madras presented two papers; one was on certain methods of anticipating Tank Breaches; the other, on the Boundaries of Tamil Nadu. He made helpful contributions to the discussions, accompanying them often with drawings on the blackboard drawn with remarkable ease and accuracy. He has a working belief in the maxim, 'no Maps, no Geography.' It may be stated, by the way, that from his study of Lahore Map, he made himself, on the very first day, as familiar with the streets and lanes and buildings as a long-time resident. And he has done so for other towns he visited on his way to Lahore up and down.

The summaries of several papers of absentee-members were read; and others were taken as read. These are a few titles of such papers:—The Sources of the Brahmaputra; Sugar-cane cultivation

17. Cities of the Madras Presidency (Madras 1916); Lucknow (C. 1918; Burra Bazar, Calcutta (1919); Indore (2 vol. 1919); Patiala (1921), and others Cf. H. V. Lanchester, Madras etc. The little manual by Linton Bogle on town planning, is an excellent guide to principles for India (Milford, India).

in India; The growth of a modern city (Coimbatore); The Fisheries of Cochin; Cole Cultivation in Cochin; Results of irrigational changes in Tanjore; Potential Spas of Sind; Greater Karachi; Tanning in South India; the Cheyyar Basin; etc.

Besides the papers of the Section, there were joint discussions with other Sections.

Dr. Arthur Geddes of Edinburgh, who had been on a Geographical Tour in India stayed on expressly to attend the Geography Section at Lahore before sailing home. He read his suggestive paper on "Some Problems of Geographical Reconnaissance in India", which is valuable equally for the methods indicated and for the new angles of approach in geographical studies. In his quiet but illuminating way, he made valuable contributions to the several discussions. With ever-ready pencil, note-book and camera, he sets an example to field-geographers in India, taking notes and sketches, observing keenly, and vivifying and verifying facts, wherever he can.

Prof. Pithawalla of Karachi made a plea for a Regional Division of India, so as to make such division the basis of scientific records. Admittedly, the present Political Divisions of India are not helpful from a scientific stand-point, being mere divisions of administrative convenience or bare results of historical accidents. A division by natural regions is a want generally felt but there is no consensus as to the criteria or their practical application.

The particular map drawn by Prof. Pithawalla turns largely on geological data; but, observed Mr. Tirunaranan, it did not adequately provide for climatic differences: the same relief sets up two different regimes of life, one on the front and the other on the lee side. Prof. Agharkar of Calcutta presented the Botanist's objection. The Botanist is not impressed by geological limits, he said, and would have his divisions follow ecology; every science should make such divisions as suit it best; and the time for finding elements common to all is not yet.

The Discussion on the Dynamic Role of the Modern Geographer was opened by Mr. N. Subrahmanyam in a lucid and convincing speech summing up the arguments from all points of view. Followed by Mr. Bannerjee, Dr. Chatterjee reverted to the teaching side; and incidentally threw it out that he intended making a soil survey of Bengal, by sampling, with his band of 150 scholars, in the Long Vacation. Dr. Geddes pointed out how inadequate it must be and he and others thought that Government alone could do it well, and suggested better utilisation of Government records and machinery.

The next discussion was also opened by the President and it was on The Agricultural Cycle in relation to the Rhythm of Life in India. Dr. Ramakrishna Ayyar of Coimbatore, the Entomologist, dwelt on the necessity of co-ordinating efforts and putting the valuable results obtained into a *calendar provided with maps and charts*. He pointed out also the attendant difficulties. Mr. Ramdas of Poona gave the Meteorologist's view. For this very purpose, he said, phenological studies of 3,000 plants have been taken up in England; not one plant has been so observed in India; it will be a long, long time before any success can be attained. All were agreed, however, that each department should make its own start, even now, making fullest use of Geographical Methods of Distribution, Correlation and Expression.

Mr. Mackenzie Taylor of The Irrigation Research Department opened the discussion on Erosion, touching on all its Indian aspects. The *pièce de resistance* was the contribution by Mr. Gorrie, who, with well-planned slides, convinced all present of the havoc wrought in the Punjab by the unrestricted grazing by goat (to which should be added the camel). Such places were contrasted with the careful husbandry in Hissar; the Punjab sides with the U. P. sides of the same mountains. His remarks explain the denuded landscape that greets the traveller in the Punjab; the denudations are so extensive that he, too, that runs by rail or bus, cannot help reading them.

It was acknowledged on all hands that in the discharge of his several duties as President, Mr. N. Subrahmanyam was admirably tactful and business-like.

The last, but by no means the least of his work, lay in his infecting with his own enthusiasm the Geographers of Lahore so as to bring them together into a common association, reconciling certain conflicts of view that showed themselves. There has been a Punjab Geographical Association under the guidance of Rai Bahadur Sohan Lal who has done yeoman's service for Geography in schools. As a result of the appeal, it has since opened a Research Section. There are keen Geographers in the Punjab. To mention but a few names, there are Messrs. Dean of the Forman Christian Collge and Syed Gauhar Ali of Gujrat; the Misses C. L. H. Geary of Women's College and Grace W. Mason of Kinnaird College. The University has Degree Courses already. One may therefore confidently hope that Punjab will stride into its rightful place in Geographical Research before long.

Mr. Dean as Local Secretary made the arrangements, excellent; Prof. Bhatnagar was all attention; the Local Secretary, Diwan Anand was very obliging. The General Secretary, Mr. J. N.

Mukherji, has brought scientific method to bear on the working of the Science Week and has raised it to a Fine Art. The working, accordingly, went off efficiently, smoothly and grandly.

The foregoing description is a brief account of the transactions at one section only, the Geography section, the youngest section and a small segment of the whole. At the Physics section, discussion on one paper alone went on from day to day; the number of papers in Chemistry Section fairly beat the time and would last beyond Sunday but for closure.

There were side-dishes also: every evening there was a general lecture and one morning, Sir Shah Sulaiman, the Federal Judge threw on the screen his formulae combining Newton and Einstein, the verification of which he expects in the Solar Eclipse of 1940.

At the Science Week, the output of intellectual work is great; and much of it is available, too, later on, in cold print. But greater than that by far is the coming together into close contact of kindred spirits from far and near. To meet, discuss and 'change views is a rich and freshening experience inexpressible in words but none the less invaluable. Of such, all have had their fill.

And then, the Social opportunities, how great they are! The Science Congress was provided with sumptuous entertainments. H. E. The Governor was At Home at Government House in the open lawn amid pleasant greenery. The Reception Committee gave an open air Tea in the cool January evening. It gave also a Variety Entertainment of which Miss Zutshi on the *sitar* is an outstanding memory. The Farewell Dinner, setting before guests a truly Punjabi hospitality, was given in the University Hall where His Excellency gave the toast of the Science Congress. The Madras Community at Lahore entertained Madras visitors at Tea. Such rounds of social meeting brought folks closer together than ever.

And then, the Excursions! The first was in the City itself. One cannot behold without emotion the ruins of former Moghul splendour visible in Shalimar gardens, the Shadhdara Mausoleums of Jehangir and Nur Jehan, the Badshahi Mosque and the Fort; nor the former Sikh Power writ large in the small Ranjit Singh's urns and the Baradari, where he held his court. The Lahore Museum exhibits the History of Punjab displaying the vestiges and Art of Hindus, Buddhists, Greeks, Moslems, Sikhs etc., from early times. It is an impressive sight to see the little finger of the Punjab Policeman, expressive of British authority, keeping order at the Mall or the Railway Station among the unruly and burly crowds.

To the Geographer, the special points of interest are the luscious grass, the hardy tonga-horse, the hardier men; the rich bazaars and the profusion of fruits and nuts and vegetables which are very cheap and widely consumed, the Park-like environs; and the Old Ravi and the New Ravi breaking through old-time pleasure-gardens of the Moghul.

The excursion to Amritsar traversed the Trunk Road which is flanked every now and then by villages looking like little fortresses or their ruins. The Khalsa College gave Tea in a delightful shamiana on the college grounds. Amritsar is one of the biggest of Trades-capitals of North India as well as the Sikhs' Holy Place. It is most densely peopled, narrow gullies being the rule, two-car roads the exception. The Jallianwala Bagh is maintained as a solemn garden. The Golden Temple with pavements of marble and cupolas glittering with gold; the Tank with marble paths and marble steps; the Temples round about in memory of former Gurus are living testimony to Sikh fervour and Sikh inspirations. Other Gurudwaras, seen at Arjun Singh Saheb, Shahid-ganj or Panja Saheb near Taxila, leave upon one the same impression. A simple, solemn air pervades those places of worship, where Bhajan to the Grandh Saheb is maintained perpetually amid throngs of religious men and women.

The excursion to Taxila, which is eight hours by rail, was splendidly arranged. A special train took the delegates by night and the whole day was spent amid the hills and the museum, and the several ruins. The weathered Buddhist stupas, the exposed site of the Greek Town with a Greek temple on the opposite hill, the wide circuit of the ancient city, and the collections in the Museum thereof specimens of ancient art testifying to former excellence and glory are ineffaceable impressions. At the beginning of the Christian era, it flourished as a University Town and Religious Centre. Its hills and its situation on the Road to India from the West, only about a hundred miles from the Khyber Pass account both for its rise and for its fall. It had a life of 800 years at least when it fell to the fury of invading hosts about Vth century A.D. and was buried in its own debris. The ruin, once begun, weathering and the dust of centuries completed it. The River Hari is in active erosion; and there is much to interest the geographer, as could be seen in Dr. Geddes' being busy taking notes of the entirely different types of men and place, settlements and country.

Taxila is a lesson in Historical Geography; Lahore and Amritsar, in Modern; but Lyllapur bears the seeds of Future Geography of the Punjab.

The Agricultural College at Lyllapur is not surpassed by any other in India. Experiments are carried on in all matters of interest to the Ryot; and the Ryot, *with his simple but strong faith and strong will*, has taken kindly to the knowledge the college provides him. Such co-operation is found nowhere else in India. Ryots, by thousands, BUY BACTERIA to infect their lucernes with, for feeding their cattle. The cultivation of rape-seed and of rye has been introduced by the College. Sugar-canes, bred at Coimbatore, are tried in the college first and then the Ryots take them: some successful ones are only a six-months' crop. The Fruits Experimental Garden is the best in India, what with vines, dates, oranges, plums, palash, etc. Experiments are in progress in fishery, in implements, in cattle food and breed, dairying and manures; in cotton and wheat, two of the principal sources of Punjab Ryots' wealth. The tried and tested successes pass on to the Ryot readily.

Near-by are Oil-mills with Hydrogenation plants; and there is a cloth-mill to which move long strings of asses and camels laden with cotton.

The roads raising clouds and whirlwinds of dust under motor-wheels; the ashen grey soil; the straight canals spreading fertility wherever its waters can reach; the plains beyond, denuded by goat and camel which leave not a shrub behind; the ramparted villages verdant with growing wheat and oil-seeds—all provide the geographer with ample food for thought.

Back to Lahore in the nipping cold, and then to the train to Madras, the ticket-dates being up. Geography and History together force themselves upon one across the Railway carriage windows. To mention one or two: the bad lands of the Chambal are among the best of their kind in India, and among the most extensive. Geography makes it plain why the conquerors found it so easy to spread along the Indo-Gangetic plain from West to East (as the Moguls did) or from East to West (as the British did)—but not from North to South or *vice versa*. It explains why the loyalty of Dinkar Rao and Sir Salar Jung was invaluable in the Sepoy Mutiny. Even through the windows of an Express Train one can read the importance of Gwalior, Jhansi or Bhopal.

Altogether, it was a great experience to have attended the Science Week at Lahore.

"Some Impressions of the Punjab"

The thirteenth annual meeting of the Association was held at the Meston Training College on 17-2-1939. The Annual Report was passed, and Office-bearers were elected: Miss E. D. Birdseye is to be the President of the year.

An ordinary meeting was then held with Sri M. Subramania Ayyar in the chair, when Sri N. Subrahmanyam, M.A., L.T., F.R.G.S. gave a lecture on "*Some Impressions of the Punjab*."

The following is a short summary of his lecture:—

The climate is very hot in summer and very cold in winter. The soil of the Punjab begins from west of the Jumna and north of the Chambal: it is a grey alluvial powdery puff; when water is brought to it, as is done through long miles of canals or by baling from wells, it yields rich harvests of wheat, pulses, oil seeds, grass and vegetables of both seasons; it supports fine breeds of cattle, like the Hissar and the Montgomery, besides hardy ponies, donkeys and camels. Under the bracing climate and the richest dietary in India, which includes milk fruits and nuts, and under the hard work entailed by the soil and the situation at the frontiers of India, the Punjabi has developed into a strong man, amenable to discipline; he is a man of deeds rather than words. Half the Indian army is recruited from the Punjab. Forts, palaces, gardens (like Shalimar), mosques and mausoleums testify to past Moslem grandeur; the Golden Temple and Gurudwaras, to recent Sikh power; and Extensions and Cantonments to present British modernity. The race of builders is not dead altogether, as Dayalbagh memorial shows.

There is great promise for the future. Already the industrial side is developing on top of agriculture; flour mills, oil mills, cotton and woollen mills, workshops, hydrogenation plants, chemical works etc., have been springing up, while cottage industries are quite alive as at Ludhiana and Gujrat in face of competition. Science finds responsive application; e.g., the chemical laboratory at Lahore has found new uses for rape-seed as motor-oil mixer and has put some lakhs into the pockets of the peasants; Bacteria to infect lucerne is sold at Lyllapur and peasants by thousands buy them. Illiterate as they are, they are the most progressive in India, being ready to translate beliefs into acts.

The Modern State of Iraq

By

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Much has been written of the "Near East" as an area of transit between East and West throughout the centuries. This importance is due to its geographical position; and, of the countries making up this area none has more significance from this point of view than the modern state of Iraq. The importance of this state is accentuated by the mineral wealth contained within its borders in the form of oil, perhaps the most vital of the mineral resources of the world to-day. These two factors, combined, have caused Iraq to become an area of intense political interest to the major powers of the twentieth century world. And as an artificially created state of Post-War origin, Iraq also presents us with two further points for consideration; her agricultural dependence upon irrigation, and the welding into a new nation of conflicting peoples with their several interests and problems.

Geologically Iraq is a sunkland, situated between the ancient Archæan plateau of Arabia, and the fold mountains of Persia. The latter ranges are of many different ages, but mainly Cainozoic, and the Mesopotamian trough is therefore comparable with the Indo-Gangetic plain in age, origin and structure. The Persian Gulf is of very recent origin and is bounded by major faults giving abrupt mountain-scarps. The border of the Iranian ranges is, however, marked by more gentle anticlines occupying part of this sunken territory. The Pusht-i-Kuh which form the Iraq-Persian boundary in Lower Iraq have the arc-like trend so characteristic of mountain-folding of Tertiary times, and provide yet another similarity between this area and comparable areas of the Tethys zone, as the Himalayan region. In Upper Iraq, north of the Diyala river, the mountains are less lofty, and the foothill zone is more marked, while the arc-like trend is less developed. Hence the trend-lines of the mountains of Northern Iraq, i.e., Kurdistan, are often unsystematic and difficult to trace, unlike the clear-cut N.W. to S.E. trend of the Zagros wall, and the (roughly) E. to W. trend of the main Armenian chains. South of these latter mountains is a belt of treeless, stony country, 40 to 100 miles broad, extending as far south as Hit, or the old coastline before the formation of the alluvial plain. The extremely flat alluvial plain slopes away from both the rivers, and thus makes possible the extensive perennial irrigation on which the ancient civiliza-

tions of Sumer and Akkad were based. The alluvium is rich and fertile, but thins out to the west, as the desert streams contribute but little sediment to the central plain, and the actual plateau is of the arid type.

The Tertiary beds underlying the Mesopotamian alluvium have been folded up into anticlinal ridges. These rise above the alluvial plain as striking and isolated ranges of hills running across the plainland of Iraq, and merging in places into the Eastern mountain wall. Near the Euphrates, about Lat. 36°N. , are the Singar mountains, the east end of which is in Iraq; they are characterised by a peculiar wall-like formation, regular and straight. Comparable with them are the Jebel Hamrin, crossing the line of the Tigris, starting from approximately the same latitude, but trending S. E., parallel to the Zagros. Less pronounced, but equally important as evidences of anticlines, are the Jebel Qaiarah, Jebel Misrak, Jebel Makkul and other hills, west and east of the Tigris, with the same general trend, N. to S., or N.W. to S.E.

The chief mineral wealth of the area is in the springs of oil, which were famous even in the olden days, and centuries of leakage have not diminished their value. The ancient oil-springs were at Hit, Kirkuk and Jibbah, and these same areas are the most promising fields to-day.

The principal oil-bearing strata are the porous "Asmari" limestone beds, which are similar to the oil-bearing limestone, of Miocene age, of the Maidan-i-Naftun oilfield in Persia. The "Asmari" limestones form part of the "Fars series", which consist besides, of beds of gypsum—sedimentary deposits—and beds of sandy clay, often stained red with iron oxide, which alternate with the gypsum and limestone. The "Fars series", together with the "Kurd series",—a zone of later fresh-water formations comprising red clays, sandstones and conglomerates,—form the Tertiary rocks which have been compressed into anticlinal folds and subsequently buried under the alluvium of the constantly expanding delta. Where the anticlines have been eroded by streams, as in the gap cut by the Tigris across the Jebel Hamrin, are found seeping tarry oil and bitumen, containing yellow sulphur, and giving off a strong odour of hydrogen sulphide.

Oil pools exist in several localities where geological conditions have been favourable for their formation. The chief modern wells are situated S.E. of Mosul, on the Jebel Hamrin anticline, which is eminently suitable, except at its south-eastern end, for the occurrence of an oilfield comparable with the best Persian ones. The wells are served by the Diyala valley railway, which connects them by way of the Khaniquin branch, with the great refinery at

Alwand. In the anticlines west of the Tigris, as far north as Mosul, viz., in the Jebel Qaiarah and the Jebel Misrak, bitumen is common, and has been much used; and German borings both before and during the Great War showed that an important oilfield is situated there, most promising near Nimrod and Hammen Ali. In the Quwair field, south-east of the junction of the Great Zab with the Tigris, where a dome-structure is apparent, have also been noted seepages of black tarry oil and numerous other evidences. The very ancient oil seepages at Kirkuk, where the first modern well was bored in 1927, were utilised by the local Arabs, one of whom obtained regularly 48 kerosene tins full daily from one pit. Here the structure however, is not ideal. The S.W. limit of the Kirkuk anticline is hidden under the Mesopotamian alluvium, and evidence suggests a probable reversed limb, or anyway a steep limb; borings could therefore easily miss the oil pools. The oil locality of Tuz Khurmatli, which has been known for a long time, also has a complicated structure, namely an anticline running S.E. to N.W., with reversed limbs, especially the south-west, and much contortion and reversed strike faults. The old wells were large pits dug near natural seepages on a line very close to, or else just south of, the axial plane of isoclinal subsidiary folding occurring in the north-eastern flank of the main anticline. A very narrow field with capricious-oil-pools tapped by rapidly declining wells is all that can be expected.

The oilfields of first class importance are those of "Qaiarah" and "Quwair"; the Jebel Hamrin, Jebel Misrak and Kirkuk areas are of secondary value, and the others less promising and more risky. The similarity of conditions between Iraq, India and Burma,—a petroliferous series, containing saline products and marine fossils indicative of a dessicated gulf, and followed by a fluviatile deposit—suggest that Iraq should rival Persia and collectively outclass Burma.¹

The story of the exploitation of Iraq's oil is a long and involved one. As early as 1904 there was rivalry between German, Dutch and British capitalists, which continued until 1914. The territory was Turkish; the oil surveys were German; but the British were interested in Persia, being in 1913 the controlling influence in the Anglo-Persian Oil Company. The Turkish Petroleum Company, however, obtained a concession from the Ottoman Government for the exploitation of the oil resources in the Baghdad and Mosul vilayets. In 1914 the Anglo-Persian Oil Company held 50% in the new concern, the rest being divided between the German and the Dutch. In 1920, in the post-war settlements, the concession was inherited by the Iraqi Government and became known as the Iraq Petroleum Company (the I.P.C.). The German interests were trans-

ferred to France, apart from 5% still held by the original concessionaire, with transport rights to Syria. America protested and obtained 25% of the British share. Hence 95% was divided equally between British (Anglo-Persian Oil Co.) American (Near East Corporation), Dutch (Royal Dutch and Shell), and French (a Franco-Belgian group) interests. The settlement of the exploitation problem is the concern chiefly of Iraq; but she is too poor to borrow money on favourable terms; the annual budget deficit has to be met by British Government; public opinion is opposed to foreign exploitation, but as it depends for developments on foreign capital, it must accept the terms. The problem was settled in 1925 when it was finally agreed to test and exploit measured plots. The question was reopened in 1929, and in 1931 the concessions were confined to an area between the left bank of the Tigris and the Persian frontiers; the plot system was abandoned, and the pipe line to the Mediterranean determined upon; and the royalties ultimately fixed.

Since then the Iraqi Government has concluded a similar agreement with the British Oil Development Company (or the Mosul Oilfields, Ltd.), whose concession area lies west of the Tigris. It is still prospecting. Another oil company is the Rafidain Oil Company, known until 1931 as the Khanaquin Oil Company (the K.O.C.), a subsidiary of the Anglo-Persian Oil Co., set up by the latter on Iraq's insistence that if it meant to operate in Iraq, it must do so by means of an Iraqi company, and with a concession from 1926 to 1969. The producing field is at Naft-Khana at the Persian border.

In the Persian Gulf area, too, there is a keen fight for oil in progress, especially on the Arabian side of the coast. The Bahrain concession has gone to "Caltex," a joint concern of the Standard Oil Company of California and the Texas Corporation, two of the biggest producers and distributors in the United States. The cost of production in this concession is lower than anywhere else in the world, because the oil is produced and delivered at sea-board. The rapid development (from 3,600,000 barrels in 1936 to 6,000,000 scheduled for 1937) is causing considerable concern to the British Oil Development Co., and other ventures, particularly in view of the competition for the Indian market. These figures may be compared with the Iraq production of 4,100,000 tons in 1936, and in 1937, out of a world total of between 240 and 280 million tons. (1 ton=7 lbs.)

A most interesting feature of the petroleum development in Iraq is the great pipe-line to the shores of the Mediterranean, costing about £10 millions, and designed to avoid payment of Suez

Canal dues on the oil shipped to Europe, which was completed in January 1935. It starts at Kirkuk, the first of the twelve pumping stations along the route, and is one of the most modern and most efficient in the world, equipped with the latest machinery.² A double line takes the oil across the Tigris and the Euphrates to Haditha, about 156 miles south-west. Thence the line forks, one branch bearing slightly north of west through Syria and Lebanon to Tripoli; the other goes south-west into Transjordan, turning north-west at Mafrak to reach the coast at Haifa, from where the main output of about two (2) million tons will be distributed. The 1150 miles of pipe-line run mostly across desert wastes, where construction was possible only with the use of motor lorries, caterpillar tractors, mechanical excavators (the "ditcher" used to cut the trench for the pipe-line could dig a trench 2 feet wide, 6 feet deep, and 1 mile long per day) and similar mechanical aids. And it now forms, by means of the telegraph lines following its course, a new route which is rapidly becoming one of the normal motor routes to Iraq.

The borings in Iraq as a whole have not confirmed the belief that it has oilfields of inestimable value; those of the I.P.C. particularly have not fulfilled the hope of either the company or the Iraq government. Nevertheless, this company, together with the K.O.C. are of the greatest economic importance to Iraq, for, excepting the Government, they are the largest employers of labour in the country. The capital invested is large, and the dues all go to Iraq. The new company, the B.O.D.C. under the chairmanship of Lord Wemyss, but chiefly Italian, Swiss and German, promoted because the rate of development of the I.P.C. and K.O.C. was not quick enough, has been a source of trouble to Iraq. International group rivalry makes the position difficult, as the large English and American companies do not favour rapid exploitation of the Mosul oilfields, but prefer to retain them as reserves, in order to avoid increasing the already large supplies of oil in the world's markets.

"Although oil has made a dramatic and highly spectacular entry upon the scene in Iraq, agriculture, as always in the past, will remain the staple industry of the country."³ The climate of Iraq tends to great extremes, though it is of the Mediterranean type. The average rainfall is less than 10" per year, and very variable; the whole year's rain may often fall in 26 days at the most. Hence irrigation is absolutely necessary for cultivation, except in the extreme north, where the slightly heavier rainfall (12") is sufficient for the winter wheat crop.

The great civilisations and the cities of fabulous wealth which Iraq supported in the past, were all directly dependent upon organised systems of irrigation. The total area once irrigated in Baby-

lonia has been estimated at 5 to 6 million acres. The average combined discharge of the Tigris and the Euphrates would irrigate 7 million acres in winter and 3 million acres in summer. Half of this could be immediately reclaimed if the ancient systems of canals were restored, with adequate drainage, and the Euphrates water turned into the land west of the Tigris, and the Tigris and its tributaries into that east of the Tigris. It is suggested that navigation should be deliberately impeded, and the railways substituted for rivers for transport purposes, and the whole of the water used for irrigation.

There are three main difficulties to be overcome; flood, silt, and waste. Under the present system of storage in the plains, some 75% of the water is lost by evaporation; and a large proportion of the flood waters also lose their way in the malarial swamps.

Almost yearly the conditions of the twin-rivers alter, particularly in the Tigris into which enormous quantities of silt are brought down with the spring floods by the Zagros tributaries, e.g., the Diyala, which has turned the main stream steadily westward towards the Euphrates. The southern tributaries form individual deltas as they approach the Shatt-el-Arab, especially the Karun. The Euphrates does not receive such mountain tributaries, yet the main stream brings down similar quantities of mud and in its lower course has many shifting branches across its alluvial deposits: marshes, lakes, and other marks of abandoned courses are found along the whole of the 300 miles of its lower course. On the whole this river tends to push itself westward, so that the true "Mesopotamia" or "land between the two rivers" has been greatly widened through the centuries. On such a plain the difficulties of building and maintaining irrigation canals must have been exceedingly onerous. Here is an explanation of abandoned cities and of declining centres of civilisation. The modern engineer's efforts, too, have to deal with these rivers' waywardness, in reviving the long-decayed systems.

A modern system to irrigate north of Baghdad follows a similar plan to Nimrod's famous dam; but the notorious Hindiya barrage on the Euphrates differs from other attempts, both ancient and modern, to regulate the Mesopotamian rivers, in that it is more a regulator of flow than a mere passive obstruction. The discovery of the Habbaniya depression and lake, west of the river, made it possible to construct an escape regulator, to divert the surplus flood waters from the Euphrates into this natural reservoir during the great spring floods, and to return it later, during the dry summer. Further south on the Tigris is the Kut barrage, to divert the surplus water into one of the ancient channels, the Hai or Gharraf.

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Its effect, when the scheme is completed, on river navigation, has perhaps scarcely been fully considered.

A significant development under the Irrigation Department of the new Government, is a system for the collection and distribution of news concerning rainfall in the mountain areas, and the possibility of flooding in the plains. The Franco-Syrian authorities supply, by wireless, readings of the Euphrates at Jerablus and Dair-es-Zor, thus giving five days' warning to those in Iraq of what is in store for them south of Ramadi.

The various irrigation schemes, fostered and protected by Government, will make Lower Iraq, where the soil is a fine silt, a fertile river alluvium, an extremely productive area. Winter crops, like wheat, but especially barley and beans, will be possible; and summer crops of cotton and millet under "dry" treatment, and rice and dates under "wet" treatment. The area which can be cultivated in winter is eight times larger than that possible in summer. In 1918-19 the area under both was 1,500,000 acres, of which only 200,000 were under perennial irrigation; this in 1927 had been increased to 500,000 acres.

The riverine tracts can be developed piecemeal by lift irrigation in a comparatively short time; it is estimated that they include between 300,000 and 500,000 acres which are too high-lying to be irrigated by the canals of the larger projects. Pump irrigation could be more widely utilised, with the supply of cheap fuel oil from Khaniquin. The artesian water supplies recently found in Upper Iraq may also be used, if they prove to be abundant, for developing perennial cultivation based on irrigation.

One of the crops most dependent upon irrigation is cotton, a new introduction as compared with cereals. It was first grown by the Germans in pre-War times, but was limited to Upper Iraq, especially the Zagros basins: the fibre obtained was coarse and poor. Climatic conditions are more suitable in Lower Iraq, where its cultivation is now making steady progress, although hindered by present world economic conditions. During the short growing season there is a high and rising temperature, with none of the cold from which both Egyptian and American cotton suffer. There is no fall in temperature until after the period of growth, when the sharp autumn fall helps the ripening. There is no summer rain, but there is sufficient moisture, when most is needed, from March to June. Especially around the Hilla Branch, the soil, a yellow variety, is very suitable. The Baghdad experimental station shows a very high yield, of good staple, 1-1½". The Egyptian type grown in Iraq equals that of Egypt in quality, both in length, strength and fineness. American varieties acclimatised in the

Punjab, are also grown, especially on 200,000 acres of the Diyala flood plain. Until recently the whole of the cotton passed through the hands of the British Cotton Growing Association, who, at one time possessed the only ginnery, capable, however, of dealing with 10,000 bales a year. When the outlook was most promising much money was invested in a rival concern, although the British concern was not a profit-making one; and the result is that neither is doing well, and the British one may withdraw.³

The rival to cotton is rice, the main grain crop, increasing as a local food, though being rivalled by maize. It is grown for both home consumption and for export, mainly along the banks of the river marshes in Lower Iraq, especially near Basra, but also in Upper Iraq. It is usually grown during the second growing season from August to November.⁴ The other grains include wheat, especially in the North, where there is a better rainfall, and it is harvested in early summer; it is mostly of the hard, poor and coarse variety, but better white varieties are being introduced. Maize, millets and sesame are grown in Lower Iraq; opium, hemp, lentils and liquorice root are the products of the Shatt-el-Arab region. Barley was of great importance in pre-war times and exported in quantities from Basra; it is the safest winter cereal because it needs a shorter growing season; it is also less liable to disease, and more capable of standing excess salts.

It is estimated that 90 millions or over 1/3rd of the date palms of the world are grown in Iraq, 15 million on the Shatt, 5 million on the Hilla, 1 million near Baghdad, and the rest along the Euphrates and in oases; producing about 400,000 tons annually, or 80% of the world's supplies. The physical possibilities of this crop are almost unlimited, and the supply of labour sufficient. Water must be abundant, but protection from flood available: so long as the ground is well cultivated for subsidiary crops, they will flourish, whatever the character of the soil or water. With the increasing population the local demand is increasing too. It is interesting to note that each season ship after ship goes to French North African ports with dates from Basra, which thus supplies all the Basra dates on the market, and a portion of "Tunis" dates as well. The annual export of 100 to 150 thousand tons, varies according to price from £1,500,000 to £2,000,000 in total value. It is a highly organised trade, with world-wide ramifications. A board is considering recent developments in the fruit markets of the world, and advising the Government as to new avenues of trade and research.

The break-up of the Turkish Empire at the end of the Great War left behind it the medley of races and cultures which had comprised it, as a legacy to the several independent political units

into which it was split up. This complexity was specially characteristic of the corridor between mountain and desert, into which migratory movements have brought many different types—basal Eurafrian, Semite, Sumerian, Medes and Persians, Mongoloid and Turk invaders, and lastly the Greeks and Armenians in quest of trade, and the “Turkish” officials who spread everywhere throughout their empire under the Ottoman government. Islam has been the only really unifying influence, and the Arabs who brought it have consequently enjoyed a cultural and linguistic influence even more preponderant than their numbers. When this corridor was reconstituted into “Mandates”, “in Mesopotamia, as elsewhere in the East, every element in that complex began to acquire a less indefinite and more crystallised form”, probably because of the political doctrine which had led to the establishment of Mandates.

Some of the problems arising from this complexity were made still more difficult of solution by the way in which the frontiers had been delimited in some places; the boundary settlements were often more influenced by the fears and ambitions of the European powers which took part in them, than by a genuine interest in the welfare of the people concerned, as for instance the Kurds. They form the majority of the 800,000 inhabitants in the Mosul vilayet of Iraq, while the rest of their “nation” are still in Persia (1 million) and Turkey (1½ millions). These people, very distinct in character from the Arabs, are still in the tribal stages, with an undeveloped national consciousness as compared with the Arab, and no “national” history. They inhabit the mountain areas to the north and east of the Upper Iraq plain which they constantly raid, and they prefer their unsettled pastoral life to the agricultural settlement so necessary in an organised state. In Turkey and Persia the Kurds have had to merge with the rest of the people, and thus be denationalised. But in Iraq, a semi-autonomous Kurdish state has been set up, within the Mosul vilayet; and the opportunity, thus provided, for Kurdish national sentiment to develop, serves to foster their dream of a “Kurdistan” uniting the minorities in the three neighbouring countries.

Mosul is definitely an Arab town, in spite of the vilayet being mainly Kurdish. This region is the richest grain-growing district of Iraq, but the area to the west of the Tigris, and towards the south, is largely inhabited by the Bedouin Arabs, who are even more truly nomadic than the Kurds. Therefore Iraq, and Mosul in particular, has to cope with an encroachment of nomadism from two opposite directions. The distinction between the true Bedouin of the desert and the agricultural Arab is, in fact, very marked, though both would appear to belong to the same physical type. The basic problem of the Arab nationalist movement is really the

rapprochement between Bedouin and settled Arab, for “to the extent that the population becomes agricultural will the nation acquire stability.” Ibn Saud has shown, by his Ikhwan colonies in the Nejd, that the Bedouins are ready for this transition to a settled peasant life; therefore Iraq’s hope for the future lies in the policy of slowly extending irrigation and persuading the nomadic tribesmen to settle on the land. Iraq has had direct dealings with Ibn Saud himself, over this same problem of the wandering Bedouin, in order to reach a settlement of a common frontier; and it has been satisfactorily solved, by allocating the actual tribes, instead of their territory, to each of the two states, and by regulating their migrations.

The creation of modern Iraq is something more than a response to the demand of an awakening people: it is the result of long years of international dispute and rivalry. Iraq flanks the land route to India; for more than 150 years Great Britain has been in virtual domination by reason of her supremacy in the Persian Gulf; she has, nevertheless, constantly endeavoured to control the route through the Fertile Crescent. Russia has desired to control Persia or Mesopotamia in order to obtain a warm sea outlet and a possible area of tropical production. Parts of the Baghdad Railway and sections of the Basra and other docks still remain as tangible evidences of the pre-War German schemes for expansion, which schemes still dominate Hitler’s aim of Nazi imperialism in the East.* France, ever desirous of Syria and other old Crusader lands, would have liked to extend her influence eastwards also. In the post-War period, the diplomatists of the Great Powers once again turned their covetous eyes to this unique valley of the two rivers.

The ancient land routes have recovered some of their former importance, with the advent of air transport and the development of desert motor services—the Baghdad-Damascus motor service takes less than twenty-four hours. They have thus gained in strategic value at the expense of the Suez route. Despite the changes in methods of transport, the routes followed are very much the same as in the past. The old caravan routes still prosper side by side with the railway, while some are followed by modern roads. The chief caravan centres are Mosul and Baghdad: the former is really the starting point of the well-known

* “We National Socialists have deliberately drawn a line under the pre-war tendency of our foreign policy. We are where they were six hundred years ago. We stem the Germanic stream towards the South and West of Europe, and turn our eyes eastwards. We have finished with the pre-war policy of colonies and trade, and are going over to the land policy of the future.” A. Hitler: “My Struggle” (English Translation of “Mein Kampf”) p. 258.

Aleppo route via Nisibin and Mardin, or alternatively to Erzerum. Five main routes diverge from Baghdad: the route to the pilgrim towns of Kerbela and Nejef and thence southwestward across Arabia to Riyadh, Jaufr, or Hail, to Mecca and Medina; westwards across the Syrian desert to Beirut, Haifa and Egypt; northwards via Mosul to Damascus, Aleppo and Istanbul; northeastwards to Teheran and thence to Turkestan and Central Asia; and eastwards to India, either along South Persia, or the Gulf.

The lines of the Iraq railways cover most of the country, and are a War-time and post-War growth centred upon Baghdad. The last link of the famous "Berlin-Baghdad railway" still remains incomplete: the direct route for the Mosul-Baghdad section was abandoned, and an alternative more northern route via Kirkuk, passing through more productive country was chosen; but recently the original project has been revived and construction continued on the final section, between Shargat and Mosul.

Baghdad has also become one of the principal airports of Asia during the last ten years; over it pass the French route to Saigon, the Dutch route to Java, the Imperial Airways' route to India and Australia, the Junkers' route to Teheran, and other routes to Europe via Baku and Moscow. "The intense rivalry of the European powers interested in the Hither East before the World War in the field of railway construction is celebrating its resurrection in the air."—British oriental policy, which has been determined for the past 150 years by care for the defence of India, and its sea communications, has been confronted since the World War with the tasks of exploring new paths. Instead of the establishment and defence of coaling stations, the requirements of the near future will be the protection of the oil supply.

It is held that Iraq has been made independent too soon, and critics who prophesied failure in what has frankly been admitted to be an experiment, have pointed out the economic weaknesses, the difficult domestic and external political circumstances, and the lack of experience, in the people themselves, of self-government in any form. The experiment has not failed, so far, in spite of the untimely death of King Feisal, whose great influence was one of the most important unifying factors in his country.

The contact with European civilisation has produced in Oriental countries several new currents in the life of their peoples. They have readily recognised the superior material wealth and power of the West, and, desiring to possess and enjoy both, they have tried to copy Western civilisation, and chiefly Western modes of life. This wholesale Europeanisation is, at the same time, strongly opposed by an intense dislike and distrust of all things European, which has its roots in the desire to be rid of European political domination. European civilisation has also given Western educa-

tion and Western political ideals to the East, and these are responsible for the growth of nationalism and the urge to reform society and religion. The rising spirit of nationalism has frequently been allied with the dislike of European domination. Social and religious reform movements tend to emphasise the importance of individual freedom, and favour the growth of secularism, and an increasing opposition to traditional social and religious institutions. All these tendencies are to be found in the Near East.

Arab nationalism is closely interwoven with Pan-Arabism. The historic meeting between Ibn Saud and Feisal in 1930 was an example of this new spirit in Arab politics, and among its first-fruits was the treaty between Ibn Saud and Iman Yahya of Yemen, concluded in 1934. In its preamble it is described as a "treaty of Muslim and Arab brotherhood to promote the unity of the Arab nation." Both parties declare that "their nations are one, and agree to consider each other's interest as their own." The artificial character of the present political frontiers and of the political structure of several Arab states, are two of the factors in favour of a Pan-Arab federation. A closer union among them seems to be precluded by the inevitable conflict between the intensely religious and puritanical outlook of the Wahabis of Saudi Arabia and the secular, materialistic attitudes of the peoples of the other, especially the more prosperous and wealthy, Arab states, like Iraq and Syria. In Iraq there will also be the conflict between this same Wahabi puritanism and the Shiah community, who form a large proportion of Iraq's population. Ibn Saud has been able to hold the desert tribes by the magic of his personality, and even weld them together into a united nation. The tasks of merging them into a larger whole in which they will not always be the most important section, and particularly of reconciling them to live in peace alongside others with a different religious outlook, will be more difficult than anything he has done so far. It seems likely, therefore, that Iraq will continue to exist as an independent state.

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 A good Atlas, as the Oxford Advanced Atlas, should be used in studying this paper.

Extracts from Periodicals

THE E. I. RAILWAY DISASTERS

A SCIENTIFIC EXAMINATION

(Extracts from "The Labour Times" of Madras of March, 1939.)

Yet another serious Railway disaster has occurred on the E. I. R., this time near Hazaribagh Road, on the 12th January 1939, bringing the major disasters to five in the course of 18 months. This cruel repetition is terribly alarming. Travellers going into the trains in these parts get panic-stricken and uncertain of reaching their destinations. It is a pity that the safest of all modes of travel should, on the sudden, be felt to turn out so perilous.

'Sabotage Theory' Questioned

Sabotage is a theory that comes handy in these enquiries, but the concentration of these disasters both in time and place in an area where anything but minor accidents have not been previously reported, and the absence of any intelligible reasons assigned for sabotage, give ample room to enquire if there may not be intelligible physical causes at work behind these disasters.

The times are normal with no discontentment assignable anywhere, and sabotage uncoupled with some general discontent has become almost unthinkable in the remarkably quick succession of these South Bihar disasters, the most terrible of which are to be located in the vicinity of the southern bank of the Ganges.

The details to be found in the press regarding the Hazaribagh disaster, are wholly unintelligible on any theory of sabotage. The tender and not the engine in front of it is said to have derailed, and 4 bogies and not another between them and the tender, and in the same way certain bogies behind, to the exclusion of their neighbours, are said to have capsized, and one of the rails is said to have been recovered from a distance.

As regards the Bihta disaster too, the blame was sought to be thrown on the XB class engines, but these are to be found working without complaint on other railways.

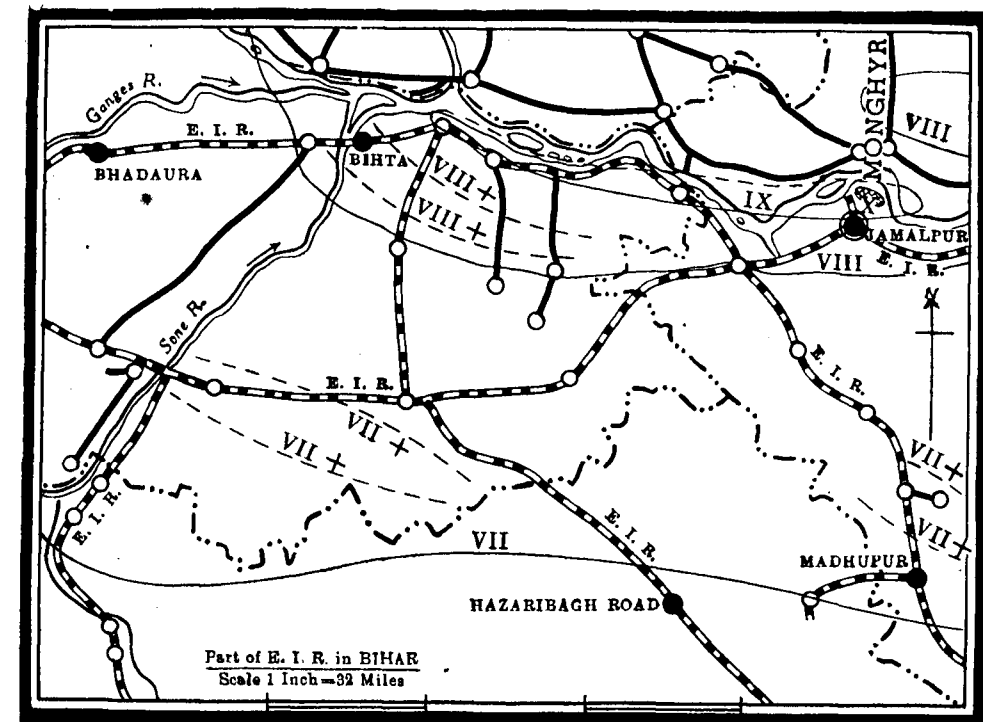
Let us look for causes elsewhere

The aim of this article is to investigate how far the available data about the hypogene forces at work in the area shown in the map below might afford a solution of this moot problem.

Earthquake Belt

The Indo-Gangetic plain that lies between the stable peninsular mass on the south and the upheaving Himalayan ranges on the north, is the earthquake belt in India which has been passing through a period of marked earthquake activity. It consists of alluvium to a depth of 1,000 feet and more, the result of pleistocene deposition; it is thus an unstable mass easily disturbed by earthquakes that, in their origin, are connected with the orogenic movements still going on in the Himalayan region.

Seismic Map of 1934 for the region of the Recent Railway Disasters.



Note.—Black dots show places of disasters. Curves in thin line numbered in Roman letters VII to X are Iso-seismals of 1934 on Mercalli's scale.

(By courtesy of 'The Labour Times'.)

The period since 1897 has been one of special seismic activity, in which year occurred the great Assam earthquake followed by that of Kangra in 1905.

The previous noteworthy disturbance occurred in 1833 and in the same area as that under consideration, namely Bihar. The accounts relating to it make it probable that it was not as severe as that of 1934, but at any rate no sufficient statistical data have been preserved. This is rather unfortunate, as from several simi-

larities that it possessed to the earthquake of 1934, data if they had existed, might have proved of great use for the present problem.

Article based on Official Investigation

As a subject of research, Seismology has to date in India from 1897, the year of the Assam catastrophe.

The study in this article will be mainly based on the detailed official investigations of the seismic zone of Bihar conducted by Dr. J. A. Dunn and Messrs. J. B. Auden and A. M. N. Ghosh of the Geological Survey of India soon after the earthquake of 1934. The map of the area appended to explain this article is one mainly adapted from their reports.

The greater part of Bihar occupies the lowest position of the Gangetic plain before it merges with its delta. On the south, the north-easterly trend of the Chota Nagpur Hills reduces the width of the plain from 200 miles in the west to 100 miles in the east. The Ganges divides the plain into two portions, a northern and a southern.

The northern division consists entirely of alluvial soil composed chiefly of loam and layers of water-bearing sand of unknown depth.

The major epicentral tract of the 1934 earthquake lay in this area and here all communications were nearly destroyed. The report of Mr. J. Williamson, Agent to the Bengal and North-Western Railway admirably sums up the damage done to railways within the isoseismals X and IX on the Mercalli's scale. "Over 900 miles of the permanent-way—1/3 of the entire system—hardly a mile of track was undisturbed. Many of the major bridges collapsed, such as the Inchcape Bridge on the Gogra and the Bur Gandak near Rushera Ghat. Hardly a culvert could be used until it had been examined and repaired. In all 361 bridges and culverts were destroyed or damaged. Embankments slumped or even disappeared, the rails remaining suspended; elsewhere they were raised or shifted many feet laterally. The permanent-way even when least distorted, may be likened to a construction line on a high new bank which has passed through a heavy monsoon without attention. So severe is the distortion in places that a trolley could not be safely taken round the kinks."

In south Bihar, the country between the Ganges and the hills of Chota Nagpur, where all the railway disasters are localised, is similarly alluvial in character but the alluvium is chiefly argillaceous and the various outcrops quite close to the Ganges indicate that its depth is not as great as in the north. The principal towns with the exception of Gaya, which lies among rocky hills south of

the river, Patna, Monghyr, Bhagalpur, Arrah, Bihta and Bhadaura lie on or in close proximity to the Ganges.

The visible destruction due to the 1934 earthquake in this region was mostly confined to masonry constructions.

To correctly estimate the causes of the disasters, it would be necessary to study the higher isoseismals on the Mercalli's scale demarked on the region.

The elongated elliptical shape of the isoseismal IX that would define the epicentral region in our area immediately dispels all doubt regarding the geological significance of the earthquake. All the isoseismals suggest that the earthquakes are due not to any volcanic but only to tectonic causes operating along a linear epicentral region arising out of a sudden fracture or fractures below the Gangetic alluvium, or from some movement along pre-existing fault planes. There are possibly two zones of fracture one below Motihari-Purnea zone and the other below Patna-Monghyr Zone.

Isoseismal lines on a map of an earthquake-ridden locality serves many useful purposes. Apart from providing information for insurance folk, they give warning that buildings, bridges, dam, embankments etc., must be designed and erected with a full knowledge of the seismic activity of the area. They show that unfavourable locations such as fault zones, sloping ground such as river banks, and the proximity to junctions of different types of formations are to be avoided. For example, Monghyr and Jamalpur seem to suffer more from earthquake shocks from whatever directions these come from, than other places in their vicinity. This has also been by some ascribed to faults at the junction of the alluvium with the Archaean basement.

In Japan important work has been done with regard to earthquake proof structures. Every type of construction includes a seismic factor i.e., resistance to a possible horizontal acceleration, which has been strictly enforced. In Quetta it is said that a seismic factor of 4.8 ft./sec.² or that usually attained in IX of Mercalli's scale, has been laid down, after the earthquake disaster of 1935, as the acceleration to be reckoned against in respect of the constructions of the military department. All countries like Japan, New Zealand, Mexico, California, Italy and Greece have enforced with great benefit seismic factors for constructions and it becomes all the more necessary to adopt similar measures in parts of India subject to severe earthquakes, if catastrophic accidents and losses are to be prevented in the future.

The isoseismal belts marked in our area may now be taken up and the concomitant phenomena observed in each noted, for it is from these that practical conclusions can be arrived at for sug-

gesting remedial measures. Isoseismals lower than VII on the Mercalli's scale are left out of consideration as they are outside of our area and their damaging effects are not at all alarming.

In Bihar there are two tracts where the intensity reached the degree of X i.e., where the acceleration reached 3.2 metres/sec². The bigger lies in North Bihar, extending from east of Motihari to Madhubani, where the railways have suffered incredible damage and with reference to which the Agent's report has been quoted above. Fissuring of the ground in this belt was severe and emission of sand and water reached its maximum. The "slump belt" of Dr. Dunn encloses this belt which again is encompassed by that of IX. In the slump belt the constructions slumped bodily into the alluvium. Subsidence of roads, causeways and railway embankments were marked. The effects of slumping were more marked along low lands, marshes and near the edges of rivers, lakes and tanks. The bench-marks mostly made on abutments of railway bridges sank one foot and over. Embankments originally 6 feet high were found at ground level and borrow-pits alongside the roads and causeways subsided. This was brought to light by the re-levelling of the Survey of India that immediately followed the earthquake. Screw pile bridges fared better although many of them were severely twisted and buckled.

Another zone of fracture where the intensity reached 3.2 metres per sec. per sec. is between Patna and Monghyr. It was probably secondary and may have been the effect of disturbances initiated below the epicentral tract relieving subsidiary zones of strain. At Monghyr the buildings were practically razed to the ground as the town is partly built on Archaean rocks. Here the devastation was especially spectacular on the alluvium. The immediate vicinity of Monghyr alone comes in this belt and is marked X in the map. Neither fissures nor slumping of the ground were noticeable except near the edge of the river on the north.

There are three areas of severe intensity equal to IX with acceleration 2 metres per sec. per sec. bounded by irregular elliptical curves, and the two most important occur in Bihar. The larger of the two occurs in North Bihar which encloses the slump belt and is not shown in our map. It extends from Motihari to Purnea. The slump belt is completely enclosed by this isoseismal. The damage was on the whole similar to but less intense than that in the more localised region of isoseist X.

Prominent fissures and faults in the alluvium were generally confined to the vicinity of such depressions as rivers and lakes. Emission of sand and water was also prominent. Regional subsidence and slumping, being functions of distance from the focal area, appeared to be moderate in this zone. The harrowing tale

of the Agent of the Bengal and N. W. Ry., in regard to this zone particularly concerns the railway.

A narrow zone however of the same intensity as IX extended from Patna to Monghyr and is to be found in the appended map. The major axis of this ellipse follows the direction of the flow of the Ganges. This curve cuts away the northern salients of the Ganges. The important places affected in this zone are Patna, Barh, Jamalpur and Monghyr. In Patna the worst damage took place along the river front. So also at Barh, the effects were more pronounced as the river was approached. At Jamalpur the disaster was most acute surrounding the railway station.

The isoseist of the next lower intensity VIII with an acceleration of 1.5 metres per sec.², is well demarcated and forms a wide belt round the higher ones and covers an area of 31,000 sq. miles. In this area the railway bridges and permanent way suffered considerably but not to the same extent as within IX and X. A number of buildings collapsed in this belt but damage due to the slumping and subsidence was occasional. Fissures and sand vents occurred sporadically north of the Ganges.

The important towns situated near its edge are Bhagalpur, Bihta and Bihar. Only a few days back it was reported on the 6th February, that at Bhagalpur a serious accident was averted by the engine driver noticing in time boulders on railway track. Though a case under Railway Act has been instituted against 'unknown person' the police themselves are understood to be of the opinion that the incident did not amount to a deliberate attempt at sabotage. It would appear to be reasonable to expect an accident at Bhagalpur due to its nearness to the river, from slight disturbances in the alluvium leading to slight changes in the railway embankment and to its general similarity to Monghyr, Hazaribagh and Madhupur in the alluvium meeting the solid gneisses of the fringe of the much dissected Chota-Nagpur plateau. At this place during the earthquake, the river became dry for a few seconds. It is along the line of continuation of epicentre, and temporary unlift of the river bed would fully explain the phenomenon. Mr. J. Williamson, Agent of the B. N. W. Ry. was an eye-witness at Monghyr and he saw the bed of the Ganges run dry for a few seconds. At a few places along the Ganges the water piled up along the south bank.

In this neighbourhood 30 miles off along the direction of the major axis of the epicentre from Bihta, is Hilsa within the same zone; here have been reported cases of subsidence of buildings, fissures and sand-vents. This is mentioned as such occurrences have not been observed in other places to the south of the Ganges. It sug-

gests the Bihta region of ill-fame to be one of special significance marked in the map as VIII *plus*. A report about this disaster says "after the derailment the track was found to have been distorted for several inches on each side from the correct alignment. This was on sleepered track but the actual derailment was on plate sleeper track rigidly held both horizontally and vertically." This seems to favour a theory that would rest on normal causes germane to ground that had suffered a violent earthquake.

In circumstances of so much disturbance it is not unnatural to suppose that the region should take time to settle and give rise to attendant railway disasters—a fast moving train being susceptible to the slightest movements of this kind of readjustments.

The last belt of any importance in our area is VII on the Mercalli's scale; it appears to have been constructed, except as to its southern boundary (which Dr. Dunn had aligned from data personally collected by him), from out of an earthquake-questionnaire. This isoseismal VII is far away from the epicentral tract and therefore the destructive power of the earthquake becomes visibly less. Inside the zone of this isoseismal a detailed enquiry has still to be made before the violence of the shock could be properly appraised.

Two isolated zones of increased intensity VII *plus* occur within this isoseismal; the westerly of the two includes Gaya and the other is in the Santal-Parganas, through which the Chota-Nagpur plateau extends to the Ganges on the north-east. Madhupur is midway between VII and VII *plus* in Santal-Parganas at a junction of the alluvium with the Archaean rocks of the plateau with an elevation of 820' above O.D., and much resorted to for its quiet surroundings. The official verdict of the enquiry over the railway tragedy here is again sabotage viz., "A rail had been removed and fish plates laid across the track." But this verdict would appear to stand on no better footing than that of Hazaribagh to which we shall next proceed.

Hazaribagh Rd. is situated just outside VII and within VI and the verdict in question has in its favour the circumstance that within VII itself the outward appearances of constructions give no hint of an earthquake having taken place. But this is no criterion of safety so far at least as moving trains are concerned. This is amply shown by phenomena observed outside belt VII. The mine areas are situated within VI and in the majority of them a large influx of water 50 to 400% above normal were reported sometimes through old fissures that had been dry for years; the rise continued for some time after the shock and the conditions were not restored to normality even after the lapse of months.

This shows how far the underground circulation of water had been disturbed and how great the consequent weakening influence on the alluvial strata in these places by way of increasing their porosity, must have been. Besides this, well attested surface undulations have been observed for example at Asansol.

At Hazaribagh we are on ground that has many parallelisms to Monghyr. In both places the alluvium is on its way to join solid rocks of the Archaean gneisses etc.; the difference between the two seems to be that Monghyr is on the epicentre and if Hazaribagh has not suffered much till now, that is only due to its being far away from the epicentre where changes and adjustments are likely to take place but slowly and imperceptibly.

It is thus probable that this disaster may have been due to some sudden oscillations of level beneath the embankment which might have disturbed the rails over it as the train was moving with high speed.

The circumstances in which this disaster has come to join the others nearer the Ganges bank, would seem urgently to call for an intensive study of the geomorphology of the locality with a view to lay bare its geological structure, especially as the results would make us understand the measures necessary for making the permanent way safe. Until this is done the better course would seem to be to deposit the verdict given (of sabotage) in a, so to say, suspense account.

In reinforcement of the idea that Hazaribagh is not as safe as the VII isoseist would make it out to be, it has to be pointed out that Allahabad is on this line and that the unreliability of it, has been emphasized in the report in these words: "Nevertheless such large towns as Mirzapur, Benares (where just as this article is in the press, an averted disaster has been reported on the 15th Feb. at Kylaht near Mirzapur) and Allahabad evinced a certain amount of major damage of the nature of collapsed houses, fallen chimneys, and severe cracking of walls."

Finally certain conclusions reached in the official report may here be gathered together.

The general form of the isoseismals show that the region between Gaya and the Himalayan Foot Hills is liable to shocks in the future, and no zones in it can be marked as possessing more safety than others.

The magnitude of the slump belt shows the alluvium has received a most severe shaking and irregular subsidence may continue for sometime to come; and the absence of fissures etc.,

is no criterion for the absence of sub-surface dislocation and releveling from time to time is necessary in the epicentral track.

In alluvial country after an earthquake, appearances of subsidence and non-subsidence are quite deceptive as to stability or otherwise and no heavy structures should be erected within at least 200 yards and more from depressions in the epicentral track; and, as a consequence, deep trenches and borrow-pits by the side of the permanent way should be avoided as otherwise the embankment is likely to sink.

It is likely that banks of rivers have shown a tendency to close inwards and very great care should be exercised in putting up constructions there; and it is a clear warning here that all the Railway Disasters have occurred on the Ganges bank.

Masonry piers and abutments should have an acceleration factor of 10ft. per sec. per sec. in all directions.

It may here be pointed out that the calamitous earthquake that followed next year at Quetta possessed a general similarity to that of Bihar in all its geological features, both being parts of the Indo-Gangetic alluvium where it meets a periphery of solid rocks

THE ANNUAL CONFERENCE OF BRITISH GEOGRAPHICAL ASSOCIATION

(Extract from *Nature*)

On January third, Sir Thomas Holland delivered his presidential address to the Geographical Association on the occasion of its annual conference at the London School of Economics. Taking as his title "The Geography of Minerals", Sir Thomas gave a penetrating analysis of Economic and political effects of the unequal distribution of mineral wealth.

Until the Industrial Revolution, little interest had been taken in mineral wealth other than the precious metals, and world development was on an Agricultural basis. Political boundaries took no notice of mineral fields. The Industrial Revolution placed a new emphasis on coal and iron, and later the development of steel-making and more the recent discoveries of the uses of alloy steels, together with the expansion of the electrical trades with their great demand for non-ferrous metals such as copper and lead reoriented the political outlook on minerals. More minerals were actually produced between 1900 and 1925 than during the whole previous history of the world, and although production is

still lower in value than that of the field and forest products it is increasing rapidly, and its effect on political geography is becoming more and more evident.

The possession of, or free access to, a wide variety of minerals is now an essential to the well-being of a great nation, and the unequal distribution of resources, together with the post-war tendency to frustrate the normal or natural movement of raw materials, is at the bottom of much of the present unrest in the World. Both Germany and the Italian Empire are lacking in many of the essential minerals.

It is a striking fact of mineral geography that some seven tenths of the world's iron and steel industry is situated in the countries that border the North Atlantic Ocean. In no other area of the world do coal and iron come together in sufficient quantities ever to give rise to other great steel-producing regions like those of the Eastern United States and Western Europe. It is this industry which has so largely affected the accessory mineral industries (Manganese, chromium, nickel, cobalt, tungsten, etc.). Between them, the United States and the British Empire own about two thirds, and control about three quarters, of the world's mineral Industries.

The need for such a wide variety of minerals has meant that the former self-sufficiency of nations in respect of mineral requirements has gone for ever. More than ever before the nations are now interdependent. Here again it is noteworthy, however, that a wide variety of resources occurs in the areas which lie around the North and South Atlantic Oceans. Thus with the British Empire and the United States on friendly terms, and the Atlantic shipping routes under their control, neither Britain nor the United States need have any fears about the supply of any mineral at present considered as vital to industry, whether peaceful or warlike. This rather one-sided position only seems to emphasize the necessity for interchange of mineral products between the nations, if civilization is not to be destroyed in the revolt of the 'have nots' against the 'haves'.

In a *symposium on India*, at the same Conference, Sir Thomas Holland contributed a short survey of India's mineral resources, dealing especially with coal and iron, manganese and chromite. Another contribution was from Lord Meston, who described in vivid terms the superimposition of British autocracy, which has converted a congeries of almost mediaeval peoples into a modern democratic State of 350 million souls, and the difficulties which rapid progress has brought. Dr. L. Dudley Stamp, in suggesting a division of India into physiographic regions, emphasized that the study of modern geography is still in its infancy in India, and that although

the universities are now taking a lead, a vast field of work awaits the geomorphologist in utilizing and correlating the mass of material available in the publications of the Geological Survey and elsewhere. In the meantime it is important that the main physical features of each of the major regions of India should be understood and regarded as an essential background to human and economic geography. Prof. H. J. Fleure finally gave a brief introduction to the study of the nature and origin of some of the Indian peoples.

Another topical item in the Conference was a lecture by Dr. Hilda Ormsby on the 'Sudeten'-lands. Dr. Ormsby also spoke on the problem of Czechoslovakia to the annual meeting of the Institute of British Geographers, which was in session during the same week. Dr. Ormsby presented a clear picture of the geographical background of the recent crisis. Before the Great War, Bohemia was an outpost of Slavdom, forming the industrial core of the Austrian Empire, and fringed with a population of Germans who had filtered across the mountains from the west during many centuries. The Treaty of Versailles allied the Czechs to the Slovaks and Ruthenians, and cut off the 'Sudeten' Germans of the northern and western fringes of the new State from their Austrian motherland. The Bohemian 'salient' of Slavdom became a violent aggravation to the new Reich after the Anschluss, thrusting a spear-head into the heart of Greater Germany. The curious nature of many parts of the 'Sudeten' frontier, which, instead of following sparsely populated, forested country, frequently cut across populous areas, was a natural incitement to the reunion of the German-speaking peoples on either side.

The 'post-Munich' frontier, however, cannot undermine the essential geographical unity of Bohemia. The similarity of the industrial occupations on both sides of the highland frontier of Bohemia (the Ore Mountains, Giant Mountains and Sudetes) means that the 'Sudeten' lands are economically tributary to the interior of Bohemia rather than to Saxony, and the fact that the Czechs, for some years, had been removing industry from the 'Sudeten' regions into the heart of Bohemia, has rendered these areas poorer and more liable to unemployment. The new Czechoslovakia, although far more homogeneously Slav than ever before, can scarcely be regarded as anything but a puppet State, held together by the power of Germany. The new German motor-road along the Moravian corridor will sever completely the western and eastern parts of the country, and the main lines of rail communication between east and west have already been cut by the new frontiers in several places.

—*Nature*, No. 3613, January 28, 1939.

Select Contents from Journals

Quarterly Journal of the Mythic Society: January 1939.

India and Old Ceylon—By A. Srinivasan.

Indian Culture: October 1938.

The Aryan Colonies of Kishkindha and Lanka—By Diwan Bahadur K. S. Ramaswami Sastri.

Calcutta Geographical Review: September 1938.

The Physiography of Rajputana—By Dr. A. M. Heron.

The Structure of the Himalayas and of the North Indian Foreland—By D. N. Wadia.

New Asia: January 1939.

Recent Italian Explorations in Tibet—By H. E. Giuseppe Tucci.
Pan-Arabism—By Asit Mukherji.

The Geographical Journal: January 1939.

Climate, Irrigation and Early Man in the Hadramaut—By G. Caton-Thompson and E. W. Gardner.

Famine and Water Supply in Western Rajputana—By F. F. Fergusson.

Geodesy in India—A Review.

The Geographical Journal: February 1939.

The Sources of the Brahmaputra, Indus, Sutlej and Karnali—
By Swami Pranavananda.

Plantation and Agriculture in Malaya, with notes on the Trade of Singapore—By A. W. King.

The Distribution of Rural Settlements.

The Geographical Journal, March 1939.

The Canadian Shield and its Geographic Effects—By E. L. Bruce.

The Fifth International Congress of Photogrammetry, Rome, 1938.

The Scottish Geographical Magazine: January 1939.

Landscape and Society—By Robert E. Dickinson.

The Growth of Inland and Seaside Resorts in England—By E. W. Gilbert.

Bracken, Heather and Mat-grass: an Ecological Triangle—By E. Wyllie Fenton.

Geography: December 1938.

The Terrain of Early Chinese Civilisation—By Percy M. Roxby.
Some Comments on the Use of Broadcasting in the Teaching
of Geography—By P. C. Going.

Physical Factors affecting Localisation of the Boot and Shoe
Trade in England—By C. P. Sargent.

The Geographical Magazine: January 1939.

People of the Hadhramaut, II—By Freya Stark.

Germany's Former Colonies, V. The Mariana, Caroline and
Marshall Islands—By Paul Hibbert Clyde.

The Geographical Magazine: February 1939.

Yucatan and the Mayas to-day—By Helga Larsen.

Places and Products, VI. Bulgarian Rose Oil—By J. Allan Cash.
Germans in the Himalayas.

The Geographical Magazine: March 1939.

Tunisia—By Alan H. Brodrick.

The Journal of the Manchester Geographical Society: Vol. XLVIII
—1937-38.

Ex-German Colonies of Africa—By Walter Fitzgerald.

Fiji: The Islands and Peoples Revisited—By Dr. J. P. Thom-
son.

Geographical Review: January 1939.

Changing Chungkiang: The Rebuilding of an Old Chinese
City—By J. E. Spencer.

The Geographical Regions of Palestine—By D. H. Kallner and
E. Rosenau.

The Bursa Region of Turkey—By Carl Louis Stotz.

Air Masses and Fronts in South America—By Preston E. James.

The Quaternary Terrace System of Southern Asia and the
Age of Man—By Hellmut de Terra.

News and Notes

This issue of the Journal, which commences the 14th volume, opens with the *Presidential Address of Mr. N. Subrahmanyam*, delivered at the Geography and Geodesy Section of the Indian Science Congress at its 26th Session held at Lahore in January 1939. It presents a synthetic view of India on a geographical basis.

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An account of his impressions of the Indian Science Congress Session at Lahore with special reference to the Geography Section is published on another page from the pen of a talented visitor.

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The first meeting of the Association for the year was held on January 2, 1939 at the Meston Training College, when Mr. K. G. Grubb of the Mildew Settlement, London, a delegate to the World Missionary Conference at Tambaram, delivered an interesting and useful lecture on "*Regional Contrasts in Brazil*," with Miss E. D. Birdseye in the chair.

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The 13th Annual Meeting of the Association was held at the Meston Training College on February 17, 1939. The 13th Annual Report for the year 1938 (appended to this number) was passed; and the results of the election of office-bearers and members of council were announced (Vide wrapper sheet). Miss E. D. Birdseye is the President of the year.

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An ordinary meeting was then held with Mr. M. Subramania Ayyar in the chair, when Mr. N. Subrahmanyam gave a talk on "*Some Impressions of the Punjab*," a summary of which is given on another page.

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A meeting of the Coimbatore Branch of the Association was held at the Students' Literary Association, Coimbatore on 7th February 1939, when Mr. S. N. Chandrasekhara Iyer (of the Agricultural College) delivered a lecture on "*The Major Crops of Coimbatore District*," with Mr. M. S. Natesa Iyer (of the Government College) in the chair.

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Another meeting of the Coimbatore Branch was held at the Municipal High School Hall on 25th February 1939, when Sri A. V.

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Kutti Krishna Menon, M.A., B.L., L.T., gave a lantern lecture on "*Impressions of Japanese Tour*", with Sri Rao Bahabur C. M. Ramachandra Chettiyar in the chair.

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A *Summer School of Geography* has been organised under the auspices of the Association to be conducted at the Geography Department of the Teachers' College, Saidapet from 17th April to 20th May 1939. Lodging and boarding for those that require it will be provided in the Teachers' College Hostel; and special arrangements are made to accommodate lady teachers. The course will be an intensive one; and will be longer than usual by two weeks.

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The *Ninth Geographical Conference* of the Association will be held at the Kellett High School on the 8th, 9th and 10th May 1939, along with the Provincial Educational Conference, when papers on various aspects of the Geography of Madras and its Environs will be read. Prof. Rao Saheb C. S. Srinivasachari of the Annamalai University will preside.

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Two *Refresher Courses in Geography* have been organised by the Deputy Inspectors of Schools, North and South Ranges of Madras City, for the benefit of teachers of Aided Elementary Schools in the two ranges at different centres; and the classes are conducted by Mr. N. Subrahmanyam.

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The Academic Council of the University of Mysore has accepted the proposal to include Geography in the Intermediate Course. It is understood that it will be actually given effect to in 1940.

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It is pleasing to note that degree courses have been recently started in Geography in the University of Calcutta, thereby coming into line with other Northern Indian Universities in this respect. Madras continues to have the degree course in the University Calendar only!

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While the disaster of the Dehra Dun Express near Hazaribagh Road in Bihar on the 12th January 1939 is officially believed to be due to sabotage—removal of rails by some unknown persons—the Special Correspondent of the *Labour Times*, extracts from whose article appear elsewhere, strikes an original note, by tracing the

causes of the disaster to the unsettled condition of earth after the terrible recent earthquake.

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We are glad to welcome the revival of the defunct Geographical Association of Ceylon, under the name of the *Ceylon Geographical Society*, with Mr. D. N. Wadia, the Government Mineralogist, as President

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The Annual Conference of the British Geographical Association was held at the London School of Economics in the first week of January 1939 with Sir Thomas Holland as President. A summary of his Address on "*the Geography of Minerals*" and of the symposium on India is published on another page.

Reviews

Map Work. By Phyllis Dink. (Atma Ram & Sons, Lahore).
Price Re. 1 As. 12.

This book is suitable for use by students preparing for the Intermediate Examination in Geography, for which map work is an essential part of the course. It covers the whole ground, as can be seen from the following list of topics dealt with—scale, representation of relief, map-reading, map-drawing from given data, distributional and weather maps, field work and projections. The treatment is simple and elementary, and nothing essential has been omitted. The exercises at the end of each chapter are just the sort required—suggestive and typical. The illustrations are choice and to the point; and the get-up neat and attractive. The book appears to be the first of its kind produced in India, which is evidence of the growing importance of geographical studies in the country.

Recent Discoveries of Fossil Algae in the Cretaceous Rocks of South India. By Prof. L. Rama Rao. (Reprint from 'Current Science,' Vol. VII, No. 5, November 1938).

Fossil algae are valuable in themselves and for dating purposes. Prof. L. Rama Rao of Central College, Bangalore and his band of co-workers have been discovering them in Trichinopoly limestones, Pondicherry limestones, and the sedimentary inter-trappean beds of the Deccan Trap at Rajamundry. This reprint is a *resume* of their work.

The Trichinopoly district finds are sub-divided, and classified, and their *inter se* relation shown. The Pondicherry finds open up a new field of cretaceous algae which have to be correlated with the Trichinopoly ones. The Rajamundry finds tend to disturb the opinion that the inter-trap beds belonged to the upper cretaceous age. A palaeocene age is indicated; and the collection of nine species of *chara* there found indicate a lower tertiary age for the inter-trap beds containing them. It is a matter in which the world palaeo-botanists who are none too many have to give their opinion. Prof. Julius Pia of Vienna to whom the specimens were submitted has given his opinion. What Prof. Birbal Sahni thinks of them we shall know by the next Science Congress at Madras. Whatever the correctness of the inferences, it is a valuable summary of

highly important work done by Prof. Rama Rao and others that is presented in this reprint.

L'Homme, La Route et L'Eau en Asie Sud-Occidentale. By J. Gottmann. (Reprint from *Annales de Géographie*: Librairie Armand Colin, Paris).

It has been a geographical problem to account for the disappearance of the great High-roads of South-West Asia which linked the three continents. Long stretches of desert and numerous buried cities mark their site. A Theory of Desiccation has been invoked to explain that: that formerly there was much water but that the climate has since gone dry.

Mr. Gottmann has no need of it. He brings cogent arguments to show that it was dry then as it is dry now. In all the excavated cities, archaeologists find wells, cisterns for water both private and public, and tapping of underground supplies, all which show not only that difficulties were felt in finding water enough on the surface but that the underground resources of water were the principal sources of supply. We have to-day the tunnelled channel: the *qanat* of Iran, the *Kehariz* of Iraq and the *karez* of Baluchistan. Geological evidences show even now the presence of such subterranean water sources in such places. The deserts were even then deserts; and it was because of the value of commerce and trade in the continents that the silk-roads and incense-roads were alive with caravans, with Arab Bedouins and camels fraught with rich merchandise. The centre of gravity shifted westward from the Mediterranean to the Atlantic; with that fell also the importance of the overland route.

There has been a re-shift of that centre Eastward upon the opening of the Suez Canal; and parallel to the sea-way, the old highroads are bound to revive. The railway from Berlin to Baghdad was an attempt; the Haifa-Damascus line runs closely. The air-ways follow those old routes. The Motor Lorry, that 'true ship of the desert' is certain to revive the old routes. Already the Arab and Bedouin have taken kindly to it. They know the value of the Ford Lorry; give it a highly prolonged life; and recognize no limit to the density of its population.

Such in outline is Mr. Gottman's thesis; and he maintains it with a wealth of erudition and insight which should bring conviction home.

Catalogue of Coins in the Madras Government Museum (Bulletin of the Madras Government Museum) New Series—General Section, Vol. III, Part 3. By T. G. Aravamuthan. (Published by the Superintendent, Government Press). (1938). Price Rs. 1 as. 8.

There are fourteen coins in the Madras Museum, besides one imitation, which were found in treasure-troves at Kunnathur (Erode Taluq), Kelshi (in Dapoli Taluq, Ratnagiri Dt.) and in Malabar, or were acquired from private collections made probably in Madura Dt.

The venetian ducats or sequins, here described belonged to the period from 1545 to 1797 A.D. Mr. Aravamudhan tells us how they used to come in, in numbers, in the imports from abroad, being prized for the purity; how India herself having good coinage, these gold coins came in as *specie* for barter against India's spices; muslins; diamonds, rubies and other precious stones; indigo; aromatic roots; etc. He enters into disquisitions upon Italian contacts; Italian adventurers and travellers from Marco Polo to Manucci; trade of the West with India; the ancient carrying trade and Inland trade of the Arab from the Japanese Sea to the Baltic Sea and Spain, accounting for Arab coins found all over; the diversion of trade from the Mediterranean to the Atlantic with consequent loss to Venice, Italy and the Arabs; and India's attracting the gold of the world, and its silver too, throughout the ages with her favourable balance of trade. He has focussed references, relevant to these in the Travel Books and other authorities; a map showing the places in the extracts would have been a valuable appendix.

Columbum at p. 18 (last para) is no other than the Malayalam name of the town Anglicised as Quilon.

What is known as *shanan kasu* prized for necklaces in Tamil Nadu is no other than the broad *sequins*. A plate at the end shows the obverse and reverse of ten of the fourteen coins in the Museum.

Settlements in the Lower Indus Basin (Sind). By Maneck B. Pithawalla, 1939, Karachi. Price Rs. 5.

Having made a geographical analysis of the main physical features of Sind in some of his earlier works, Prof. Pithawalla now attempts a synthetic treatment of the history and progress of human settlement in the region, bringing out the influence of the geographical features on the settlements. In the first part of this thesis, which is a reprint from the Journal of the Madras Geogra-

phical Association (Vol. XIII—No. 4), the influence of the climatic, geomorphological, tectonic and hydrographical changes in the region have been examined to afford the proper basis for a study of the present conditions and problems of population in the Province as well as of the work of man—dealt with in part II. The brochure is well illustrated with maps and diagrams, among which special mention may be made of the use of the *ergograph*, suggested by Dr. A. Geddes, showing the annual rhythm of human life and activities.

A Bibliography of Sind: By M. B. Pithawalla, 1939, Karachi. Price As. 4.

This is the reprint of a paper contributed to the Lahore session of the Indian Science Congress. It discusses the causes for the existence of over a score of hot springs within 100 miles of Karachi, and suggests that Government may develop at once six of them, well-known for their curative virtues, providing modern facilities of residence etc.

Greater Karachi. By M. B. Pithawalla, 1938, Karachi. Price As. 4.

This is also a reprint of another paper, read at the same session of the Indian Science Congress. After discussing the peculiar population problems of Karachi as a rapidly growing provincial capital under the influence of the Sukkur and Canal Colonies of its hinterland, the author suggests the building of satellite towns within a radius of 12 miles, with independent water supply and modern transport facilities for avoiding the present congestion and providing for future expansion.

A Bibliography of Sind. By M. B. Pithawalla, 1939, Karachi. Price As. 8.

The publication of a list of works of geographical value bearing on Sind, arranged authorwise in alphabetical order, prepared in the first instance apparently for his own guidance by the author, ought to prove useful for other workers in the same field of research.

Exercises in Modern Geography: Book VIII—Africa. By A. W. Coysh and D. M. Hunt. (University Tutorial Press). Price 1sh.

This is one of a series of Practical Exercise Books in Modern Geography, the earlier numbers of which have been reviewed in

back issues of this Journal. The exercises, which are suggestive and stimulating, have been carefully thought out and well-planned, calculated to encourage atlas study and the critical examination of pictorial material, of which typical examples are provided. The series can be used profitably in secondary schools, whatever may be the prescribed syllabus.

An Atlas of Indian History (Hindi, Urdu and Bengali editions).
By E. W. Green. (Macmillan & Co.). 1938.

We are glad that the publishers of this very useful atlas in English have read the sign of the times aright and have brought out editions of it in three of the most widely spoken Indian languages—Hindi, Urdu and Bengali. Now that teaching the non-language subjects through the medium of the mother-tongue is the vogue, there is need for reproducing them in the other chief Indian languages also.

We repeat what we stated about the English edition that the value of this atlas is enhanced considerably by its three peculiar features—(1) of illustrating periods and not isolated stages or special events only (i.e., “representing the road and not merely the milestones”), (2) of illustrating the main geographical features that have influenced the course of Indian History, and (3) of indicating the extent and importance of India’s external relations, and emphasizing the fact that India has never been an isolated country but “a link in a great chain of countries.”

Bhuvivarane (Canarese). By M. N. Kamath. (School Book Co., Mangalore), 1938. Price As. 12.

This is a text-book of geography in Canarese for form IV, prepared in accordance with the revised S.S.L.C. Syllabus of the Madras Educational Department. The matter is presented in easy and simple Canarese in a lucid manner by an experienced teacher of the subject; and the book is illustrated with maps, pictures and diagrams, and printed in bold type and well got up. The exercises given at the end of the book are suggestive and useful; but it is preferable that they are distributed among the several pertinent chapters, so that they can be worked out at the end of each lesson as part of its study.

Books and Journals Received

- Map Work.* By Phyllis Dink.
- Exercises in Modern Geography: Book VIII: Africa.* By A. W. Coysh and D. M. Hunt.
- Settlements in the Lower Indus Basin: (Sind).* By Maneck B. Pithawalla.
- Greater Karachi.* By M. B. Pithawalla.
- Potential Spas of Sind.* By M. B. Pithawalla.
- A Bibliography of Sind.* Compiled by M. B. Pithawalla.
- Bhuvivarane (Canarese).* By M. N. Kamath.
- Regional Geography of the World (Tamil).* By N. Subrahmanyam.
- Recent Discoveries of Fossil Algae in the Cretaceous Rocks of South India.* By L. Rama Ro.
- Catalogue of Venetian Coins in the Madras Government Museum.* By T. G. Aravamuthan.
- Report on the Operations of the Department of Agriculture, Madras Presidency, for the year 1937-38.*
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- Journal of the Manchester Geographical Society: Vol. 48—1937-38.*
- Verzeichnis der Periodisch. Schriften der Bucherie der Gesellschaft für Erdkunde zu Leipzig.* 1938.
- Kalaimagal: December 1938, January, February and March 1939.*
- Indian Journal of Economics: October 1938 and January 1939.*
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The Ramakrishna Home and Schools Magazine : January 1939.

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THE THIRTEENTH ANNUAL REPORT OF THE MADRAS GEOGRAPHICAL ASSOCIATION, 1938

The Council has the honour to present the following Report for the period from January 1 to December 31, 1938.

The strength of the Association stood at 152 members at the end, and at 165 members at the commencement, of the year. The fall in the number is due chiefly to the dropping-off in Associate (i.e., non-Journal) Members.

The Journal is subscribed for by 158 as against 150 in the previous year.

The State of Finances of the Association is set out by the Auditor, in his Report which is Appendix B hereto. Receipts under diverse heads are Rs. 2,519-6-1 and of this Rs. 75 is a donation from Mr. N. Subrahmanyam. The expenses have been Rs. 2,398-0-4 excluding about Rs. 250 for outstanding Bills. The accounts have been cleaned up by striking out arrears of subscription borne in the books but found irrecoverable. The previous advance of Rs. 404 by the Secretary has had to be carried forward, as the expenses were very great due to the increased expenditure incurred in improving the quality of the Journal.

The Eighth Geographical Conference was held at Mangalore, May 19 to 22, 1938. A report of the Proceedings is printed in *The Journal* (Vol. XIII, pp. 219-20). Several of the Papers, read there, have been printed in the September and December issues of that Volume. Studies in District Geography inaugurated by the Association now comprise eight districts.

Some of the most distinguished British Geographers attended the Silver Jubilee Session of the Indian Science Congress at Calcutta, in January 1938. It is very gratifying to note that they have been highly impressed with the work of this Association, in all directions, in the twelve years past. Such warm approbation of such work by such men, so pre-eminent in Geography, is a treasure and inspiration to those responsible for its activities. Three of them passed through Madras and their presence was availed of by the Association so as to have the benefit of their illuminating discourses.

Dr. Arthur Geddes of Geography Department, Edinburgh, who has been on a geographical tour in India these six months, was in Madras in September, 1938; and in his simple, quiet way, had given many a helpful suggestion.

Geography is winning wider and wider recognition in India, as is evident from the fact that North Indian Universities like Aligarh, Agra, Lahore, Patna and Calcutta have opened and offer Degree courses in it. It is evident also from the fact that the Indian Science Congress has made Geography into a separate Section permanently. This Association notes with pleasure that one of its members, Mr. N. Subrahmanyam, was elected to be the President of the Geography Section at its Lahore Session (January, 1939) and that its next session is to be held in Madras (January, 1940).

An Association, such as this, with its record of solid work looks forward with hope to another year of useful activities.

GOPALAPURAM,
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(By Order)
N. SUBRAHMANYAM,
Secretary.

APPENDIX A. List of Meetings of the Association in 1938.

Date.	Subject.	Lecturer.	Chairman.
11-1-38	Land Utilisation, Maps for India.	Dr. L. D. Stamp.	Mr. G. Narayanaswami Ayyar. Mr. T. R. Venkatrama Sastri. Mrs. Sundara Raj.
13-1-38	Aim and Method of Teaching Geography.	Prof. C. B. Fawcett.	
12-2-38	The Annual Meeting.		
28-2-38	Impressions of my recent World Tour.	Mrs. P. S. Sundara Raj.	
19-3-38	The Rivers of the Palar Basin.	B. M. Tirunaranan.	K. C. Ramakrishnan. Miss E. D. Birdseye, K. Narasimha Ayyar.
11 to 30 } -4-38	Summer School of Geography and Popular Lectures at Bangalore.	Vide Journal, Vol. XIII pp. 211-8.	
19 to 22 } -5-38	Eighth Geographical Conference at Mangalore.	Vide Journal, Vol. XIII pp. 219-20.	
23-7-38	Trade of the Madras Port.	K. Ramamurthy.	
11-9-38	Dynamic Problems of Indian Geography.	Dr. Arthur Geddes.	
26-11-38	A Peep into Kashmir.	K. C. Veeraraghava Ayyar.	

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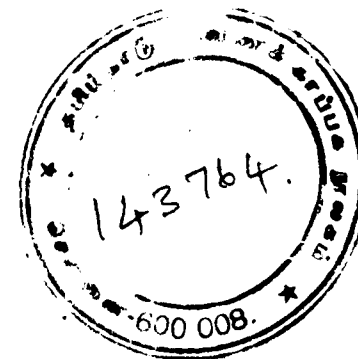
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