

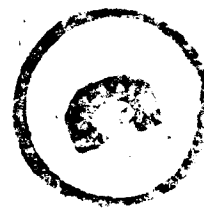
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(முதல் பாகம்)

பொருளடக்கம்.

I. எண் மானமும்; எண் திறப்பும் :—எண்கள்; இலக்கங்களால் எண்களைக் குறித்தல்; எண்களின் கய மதிப்பும் ஸ்தான மதிப்பும்; ரோமன் வழி. II. கோடுகளும் புள்ளிகளும் நீள அளவையும் :—கீழ்ப்; ஸர் பெஸ்கன்; கோடுகள்; புள்ளிகள்; கோடுகளின் வகைகளும் நேர்கோடுகளைப் பரீட்சிக்கும் விதமும்; புள்ளிகள் குறித்தலும் கோடுகள் இழுத்தலும்; நீள அளவு; டிவைடர்களின் உபயோகம்; எண்களை நீளத்தால் குறித்தல். III. கூட்டல் :—கூட்டலின் அர்த்தமும் உபயோகமும்; கூட்டலைப்பற்றிய ஓர் உண்மை; கூட்டலைப் படத்தால் காண்பித்தல்; அடைப்புக் குறிகள்; கூட்டல்; பெரிய கணக்குகள்; கழித்தல்; கழித்தலைப் படத்தால் காட்டுதல்; பலவகை கழித்தல் வழிகள்; கூட்டல் கழித்தலைப்பற்றின சில விதிகள்; கலப்புக் கூட்டலும் கழித்தலும். IV. பெருக்கல் :—பெருக்கலைப் படத்தால் காண்பித்தல்; ஒரு ஸ்தான எண்ணால் பெருக்கல்; எந்த எண்களைக் கொண்டும் பெருக்கல்; பெருக்கலில் குறுக்கு வழிகள். V. வகுத்தல் :—வகுத்தலைப் படத்தில் காட்டுதல்; ஒரு ஸ்தானத்தால் வகுத்தல்; பாட்டர்களால் வகுத்தல்; 10, 100 முதலிய வகைகளால் வகுத்தல்; நீள வகுத்தல்; வகுத்தலின் இன்னொரு அர்த்தம்; சில பெருக்கல் வகுத்தல் விதிகள் பெருக்கல் வகுத்தலில் சில குறுக்கு வழிகள்; ஒன்பதுகளை நீக்குதல். VI. பலவின வெண்கள் :—அளவை வாய்ப்பாடுகள் : காணாய அளவுகள்; நிறை அளவுகள்; நீள அளவு; பிடித்தல் அளவு; கால அளவு; அகித அளவு; எண்ணிக்கை அளவு; இனமாற்றத்தல்; பலவின வெண் கூட்டல்; கழித்தல்; பலவினவெண் பெருக்கல்; பலவின வெண் வகுத்தல். VII. கோணங்களும் அவற்றின் அளவும் :—திசை, திசைமாற்றம்; கோணம், கோணங்களை ஒப்பிட்டுப் பார்த்தல்; நேர்கோணம்; சதுரங்களும் ரெக்டாங்கிள்களும்; வட்டங்கள்; கோணங்களின் அளவு; கோணங்களின் வகைகள்; ப்ரொட்டாண்டரைக் கொண்டு கோணங்களை வரைதல்; ஒரு புள்ளியிடத்தில் உள்ள கோணங்கள். VIII. டெஸிமல்கள் :—டெஸிமல்களின் அர்த்தம்; டெஸிமல் குறிப்பில் ஸ்தான மதிப்பு; இரண்டாவது டெஸிமல் ஸ்தானம்; டெஸிமல் குறிப்பு பொது விவரம்; ஒரு டெஸிமல் ஸ்தானமுள்ள எண்கள்; டெஸிமல் கூட்டல்; டெஸிமல் கழித்தல்; எந்த எண்களையும் கழித்தல்; 10, 100 முதலியவகைகளால் பெருக்கல்; ஒரு ஸ்தானமுள்ள முழு எண்ணால் பெருக்கல்; ஒரு ஸ்தானமுள்ள முழு எண்ணால் வகுத்தல்; பல ஸ்தான முழு எண்களால் பெருக்கல்; பல ஸ்தான முழு எண்களால் வகுத்தல். IX. உயர்ந்த பொது அளவும் தாழ்ந்த பொது மடங்கும் :—அளவும் மடங்கும்; பொது அளவும் மடங்கும்; உயர்ந்த பொது அளவும் தாழ்ந்த பொது மடங்கும்; பாட்டர்களால் இரண்டு அல்லது இரண்டிற்கு மேற்பட்ட எண்களின் உ. பொ. அ. உம், தா. பொ. ம. உம் கண்டுபிடிக்கும் வழி; உ. பொ. அளவைக் கண்டுபிடிக்கும் பொது வழியைப் படத்தால் காட்டல்; உ. பொ. அ. பொது வழி. X. சாதாரண பீன்கள்கள் :—பலவின அளவுகளின் பின்னங்கள்; ஒரு கான்சீட் அளவை இன்னொரு கான்சீட் அளவின் பின்னமாகச் சொல்லுதல்; சமமான பின்னங்கள்; சமமான பின்னங்களைப் படத்தால் காட்டுதல்; பின்னங்களின் சமத்துவம்; தாழ்ந்த

உறுப்புகள்; பின்னங்களை ஒப்பிடுதல்; பின்னங்களின் கூட்டலும் கழித்தலும்; ஒரு சாதாரண பின்னத்தை ஒரு முழு எண்ணால் பெருக்கல்; சாதாரண பின்னத்தை ஒரு முழு எண்ணால் வகுத்தல்; ஒரு பின்னத்தால் பெருக்கல்; பின்னத்தின் பின்னம்; ஒரு பின்னத்தால் வகுத்தல்; ஒரு எண்ணை ஒரு குறிப்பிட்ட அளவிலே டர் உள்படி மாற்றல்; பின்னங்களைச் சுருக்கல். IX. வாடிக்கை முறை.—பலமாதிரிக் கணக்குகள். பரீட்சைக் கேள்விகள். விடைகள்.

முதல் பாகம் 5-வது வகுப்புக்கும் 1-வது பாரத்திற்கும், கிரௌன் 300 பக்கங்கள், விலை அணா 12.

Approved as a Text-Book suitable for School use,

vide Fort St. George Gazette, Part I-B, p. 546, dated 1-11-27.

(இரண்டாம் பாகம்)

பொருளடக்கம்.

பரீட்சைக் கேள்விகள். I. டெஸிமல்களின் பெருக்கலும் வகுத்தலும்; ஒரு ஸ்தான டெஸிமல் எண்ணால் பெருக்கல்; சமமான பரிசோதனை; எந்த டெஸிமல் எண்ணால் பெருக்கல்; டெஸிமல்களால் வகுத்தல்; சமராய்ச் சொல்லல்; சாதாரண பின்னங்களை டெஸிமல்களாக மாற்றல்; டெஸிமல்களை சாதாரண பின்னங்களாக மாற்றல். II. காசரி, ரோஷியோ முதலானவை : சாசரி; ரோஷியோ; மாறாத ரோஷியோ; ரோஷியோவின் உபயோகங்கள்; ப்ரபோர்ஷன்; லாப நஷ்டம்; வருமான வரி; கடன் மிகுதல். III. பாப் பளவு; பாப்பளவு; ரெக்டாங்கிள்; இங்கிலீஷ் பாப்பளவுகளும் ப்ரெஞ்சு பாப்பளவுகளும்; பாப்பளவு வாய்ப்பாடுகள்; பிளான் வரைதல், அதாவது அமைப்புருவம் வரைதல்; தரையின் பாப்பளவும் நாய்ஸவர்களின் பாப்பளவும்; கட்டி காதித்தலின் உபயோகம். IV. பொது எண் கணக்கு—சமீகாணங்கள் : அங்க கணிதமும் பீஜ கணிதமும்; சில பெயர் வினக்கங்கள்; சமீகாணங்கள்; இன அங்கங்கள்; அடைப்புக் குறிகள் கீக்குதல். V. முக்கோணங்கள் : அவற்றின் பக்கங்களும் கோணங்களும் : முக்கோண விரிப்பு; முக்கோணங்களின் கோணங்கள் பக்கங்களுக்குள்ள சம்பந்தங்கள்; ஒரு புள்ளியிலிருந்து சிபந்தனைக்கிணக்க மற்றொரு புள்ளி குறித்தல்; இரண்டு புள்ளிகளிலிருந்து சிபந்தனைகளுக்குக் கிணக்க மற்றொரு புள்ளி குறித்தல்; கொடுக்கப்பட்ட அளவுகளைக் கொண்டு முக்கோணம் வரைதல்; வட்டங்களின் சில தன்மைகள்; முக்கோணங்களின் வகைகள்; ஓர் புள்ளியிலிருந்து ஓர் கோட்டிற்கு பெர்பெண்டிகுலர். VI. கோடுகளையும் கோணங்களையும் இருசமபாகங்கள் காக்கல் : இருசம பக்க முக்கோணங்களின் சில தன்மைகள்; நேர் கோடுகளை இருசம பாகங்களாக்குதல்; கோணங்களை இருசம பாகங்களாக்குதல்; கார்ட்களையும் வட்ட பாகங்களையும் இரண்டு சம பாகங்களாக்குதல்; பெர்பெண்டிகுலர்கள் இழுத்தல்; ஸிம்மெட்ரி. பலமாதிரிக் கணக்குகள்; முதல் பாரப் பாடங்களில் புதிய கணக்குகள் :—கூட்டல் கழித்தல்; பெருக்கல்; வகுத்தல்; பலவின எண்கள்; கோணங்களும் வட்டங்களும்; டெஸிமல்கள்; உயர்ந்தபொது அளவும்; தாழ்ந்த பொது மடங்கும்; சாதாரண பின்னங்கள்; பலமாதிரி. இரண்டாம் பாரப்பாடங்களில் பலமாதிரிக் கணக்குகள். பரீட்சைக் கேள்விகள். அறுபத்தாம். விடைகள். இரண்டாம் பாகம் 2-வது பாரத்திற்கு, கிரௌன் 208 பக்கங்கள். விலை அணா 10.

Approved as a Text-Book suitable for School use

vide Fort St. George Gazette, Part I-B, p. 513, dated 13-11-1928.

(மூன்றாம் பாகம்)

பொருளடக்கம்.

பரீட்சைக் கேள்விகள்; அத்தியாயம் I. நூற்றுக்குக் கணக்கிடலும் அதன் பிரயோகங்களும்; II. ருண எண்களும் பீஜ சமீக்கைச் சேர்க்கைகளும்; III. சமாந்தரக் கோடுகளும் அவற்றின் தன்மைகளும்; IV. படக் குறிப்புகள்; V. ப்ரபோர்ஷன்—நோனதும் மாறானதும்; VI. முக்கோணங்களின் சர்வ சமத்துவம்; VII. முக்கோணங்கள், சமாந்தர நாய்பக் கங்கள், வட்டங்கள் இவற்றின் பரப்புகள்; VIII. பருமன் அல்லது கன அளவு; IX. தனிச் சமீகரணங்களும் அவற்றிற்குக் கொண்டுவீடும் யோசனைக் கணக்குகளும்; X. பலவகைக் கணக்குகள்; பரீட்சைக் கேள்விகள்; பலமாதிரிக் கணக்குகள்; விடைகள்; பலவின அளவு வாய்ப்பாடுகள். Cr. 8vo. 300 pages. விலை அணா 12.

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UNIVERSITY OF MYSORE : CONVOCATION ADDRESS.

By

Sir C. V. RAMAN, Kt., M.A., D.Sc. (Hons.), F.R.S.

I FELT highly honoured by the invitation to address this Convocation, and did not hesitate to accept it, even though, coming at a time just prior to my departure for Europe on scientific deputation, it has involved a certain dislocation of my work. For many years, I have felt a keen interest in the fortunes of Mysore, and of late my visits to the State have been so frequent that I might almost claim to be acquiring a domicile in His Highness's territory. The fact that Mysore has in the past offered scope for the activities of such distinguished administrators as Sir K. Seshadri or Sir M. Visvesvaraya, and claimed the allegiance even temporarily of a Brajendra Nath Sengal or a Radhakrishnan is in itself sufficient to invest the State with a certain halo of glory. There is much in Mysore to

arrest the attention of every educated Indian. The great works of public utility at Sivasa-mudram and Krishnarajasagara, and the industrial activities of the State at Bangalore and Bhadravati would alone have been sufficient to set Mysore on a pedestal, to be viewed with respectful admiration by other parts of India. The fame of Mysore has been spread far and wide by these and other evidences of the wisdom and enterprise on the part of her ruler and of those who have helped in her administration. As a man of science, my whole-hearted admiration goes out to that act of far-sighted policy which led to the establishment at Bangalore of the Indian Institute of Science. The full fruits of that act may yet some day be reaped in a harvest of fame and wealth for the Mysore State, nay, for all India. For several years, the affairs of the Institute have claimed my personal attention, and it has been my constant endeavour to try and hasten the advent of that glorious day.

At no time in the history of India, so far as I am aware, did the cultural contacts of the different parts of our great country altogether cease. Developments in any part of India have had, and will continue to have, repercussions in every other part of the country. For this reason, if for no other, the progress of Mysore will be watched with the keenest interest in other parts of India. If Mysore advances, it will rejoice the heart of every Indian. If she lags behind, the rest of India will also suffer. No one doubts to-day that Mysore has a special and distinctive contribution of her own to make to our national culture.

As one instance of the way in which different parts of India can benefit by an exchange of ideas, I can mention the activities of the Indian Science Congress. I have even to-day the most vivid recollection of my first visit to Bangalore in 1917. Many pictures stand out in my memory, of those few days of hectic activity. The unaffected, though impressive, kindness with which the delegates to the Congress were received by His Highness in the grounds of the Palace amidst the sweet strain of Indian music, the first impressions of Bangalore with its notable public buildings and a general aspect so strikingly individualistic, the odoriferous activities of the Sandalwood Oil Factory, the great campus of the Indian Institute of Science which for the time being became an arena for a boomerang display by a former Director-General of Observatories, these and other vignettes remain firmly impressed in my memory. Remarkably enough, however, what interested me most in that visit to Bangalore was a little tube of glass six inches long and half an inch broad which I saw used in a demonstration at one of our meetings. That little tube of glass filled with the glowing

vapour of mercury and emitting a dazzling white light came to me as a revelation. It opened my eyes to the immense power of the mercury arc as a tool of scientific research. You have all read in the Arabian Nights the story of how Alladin discovered, by accident, the secret of the wonderful lamp that was later to bring him wealth and fame. Alladin rubbed the lamp, and out came a mighty spirit ready to do his bidding. It is no exaggeration to say that the quartz mercury arc is the veritable Alladin's lamp of modern physics. Under the touch of the electric current springs from it a mighty spirit, travelling with the velocity of light, capable of performing the most wonderful tasks, a spirit capable of making itself as small as a hundred millionth part of an inch, nay, of entering within the atom or the molecule itself and of exploring its internal structure. It was no accidental coincidence that eleven years later, it was the same mercury arc lamp which served me to discover the new radiation effect which you may have heard of, and it was equally no accident that within a few days of the discovery, I chose a group of scientific men gathered at the same Central College at Bangalore as the audience before whom to place the first scientific account of the discovery.

There is no sphere of human activity which tends to draw peoples of diverse lands and cultures together and create bonds of sympathy and friendly understanding so much as the pursuit of knowledge. Knowledge is universal by its very nature. A fact of nature newly discovered is a discovery whose significance or utility cannot be altered by the colour of the discoverer's skin or his nationality. Hence, recognition of such discovery is usually spontaneous. A striking example of this is furnished by the fact that the bitter feelings existing be-

tween England and Germany during the war did not prevent Englishmen of science giving the fullest and promptest recognition to the work of Einstein. The speedy reconciliation of England and Germany that has followed after the war is, I believe, due not a little to the cultural and intellectual domination which Germany continues to exercise over the whole world and which remains unaffected by her defeat on the field of battle.

Intellectual activity of the highest type such as every University should strive to develop is a force of incalculable power and importance for the national welfare. Apart from the direct results of such activity in promoting agricultural, industrial or commercial progress, its indirect results are even more important. Intellectual stagnation is equivalent to national decay and death. Intellectual activity, on the other hand, leads to a quickening of the national life in all its aspects. To a normal human being in full possession of his faculties, the ideal of healthful happiness is not a life of slothful inactivity or placid contemplation, but one of varied activity, both physical and mental, interspersed by the minimum periods of rest which Nature demands for recuperation. Either physical or mental activity by itself is incomplete and insufficient for the maintenance of human efficiency at its highest level. The mainsprings of intellectual activity in every country are education and the spirit of inquiry, and its quality varies with the standard set by the thinkers and educators of the nation. Thus, in the last analysis, it is the leadership offered by the Universities that determines the level of intellectual activity in the country and therefore also the national efficiency.

In thus drawing attention to the relationship between national welfare and the work done

in the Universities, I would wish to emphasise the danger of allowing such work to degenerate into a deadly routine of formal teaching and formal examination. The tendency of all formal schemes of education is to regard the human mind as a kind of soft metal to be squeezed into shape by intense pressure into the hard steel moulds of syllabuses and examinations. This kind of mechanization of education is, I believe, most deadly in its effects, and is responsible for not a little of the intellectual sterility of the finished products of our Universities. The essence of education is the development of individuality and personality, and it is easily possible to carry the idea of formal training and intellectual discipline to the point of extinguishing such individual development. I would say that the good is often the enemy of the best. Formal training should make way in favour of individual freedom of study and work wherever and whenever the latter promises the best results. It is here that the discernments and sympathy of the teacher are most needed.

The ideal of University work is the provision of opportunities for special abilities of teacher as well as of students, to express themselves. How this is to be done without dislocating the general activities of the University is, I consider, one of the most important problems in University administration, and its successful solution requires the most careful and sympathetic consideration. It is my conviction that, at the present time, Indian Universities generally pay less attention to the development of special activities and abilities and more to purely routine activities than should really be the case. In a general way, of course, the differentiation between Pass and Honours courses recognizes the importance of giving special opportuni-

ties for special ability. But this, in my view, is not enough. There should be greater freedom for the expression of individual ability, and more time and opportunities for research work, for teacher and student alike, in those cases where evidence of ability to profit by such opportunities is forthcoming.

During the last few years, there has been a growing recognition that India is not a negligible factor in the advance of human knowledge. I will go further and say that the world outside has begun to learn that the Indian intellect can occasionally march abreast, or perhaps even lead, in the onward march of scientific progress. This is certainly a position in advance of that freely expressed ten years ago that the Indian mind was by nature sterile, and is, in my opinion, largely the result of the work of the younger generation of scientific workers in India during the last ten years. But the position reached is, in my opinion, still quite unsatisfactory. A great many new Universities have sprung up all over the country and in many of them Indians are holding appointments with some opportunities for original work. Some of them are, no doubt, showing praiseworthy activity. But taken altogether, I think, not enough is being done. The reason for this is a matter which I would recommend to the University administrative bodies all over India carefully to investigate and set right without delay. In some cases, it may be lack of opportunities for research, by reason of excessive insistence on routine teaching; in others, it may be lack of research equipment. I hardly think the lack of competent students or helpers can be the cause. If there is any point on which I feel a confidence derived from experience, it is that there is abundance of talent in the younger generation awaiting the right kind of leadership.

The field of human knowledge at the present time is in an extremely interesting state. The principal feature of the activity of the nineteenth century may be described as the fragmentation of knowledge into a large number of small holdings with uncultivated boundaries between them—mathematics, astronomy, physics, chemistry, geology, botany, zoology, sociology, economics, politics, psychology, philosophy, and so forth. During the last twenty years, however, a strong movement has set in towards a new synthesis of knowledge. A change has occurred in our philosophic outlook which is tantamount to a recognition that, in spite of her immense diversity, Nature is still one and indivisible. The barriers artificially set up by the nineteenth century between the different branches of knowledge are fast crumbling to pieces and in many cases, for instance, as between physics and chemistry, have completely disappeared at the present time. The current of present-day progress thus gives a new strength to the University idea which recognises the essential impartibility of that great estate which we call human knowledge. Not only so, but this also gives us fresh reason for hoping that India with her well-known power of synthetic and philosophic thought may yet, if she exerts herself, rise once again to a position in which she can lead the world in intellectual advance. But this is a mere possibility and to convert it into an actuality requires strenuous effort, and calls for a revival of our ancient love of learning compared with which the Renaissance of Europe in the Middle Ages would sink into insignificance.

The spirit of modern knowledge is repugnant to vague and unsupported speculations. An unhesitating rejection awaits generalisations, however attractive, based on mere sentiment or belief, or on an incomplete analy-

sis of experience or experiment. Rigour, logic, precision, attention to detail, a disinclination to gloss over essential differences, and the most rigid power of self-criticism—these are what modern science demands. These habits of mind are hardly developed by the mere passive absorption of knowledge in the lecture room or library. Indeed, knowledge as embodied in a formal treatise or lecture is apt to convey an impression of static perfection which is deceptive and induces the mind to adopt an attitude of uncritical acceptance. The highest qualities of mind are evoked by knowledge which presents itself in a dynamic but imperfect form, calling for criticism and personal investigation for its adequate appraisal. This is the real value of research as an instrument of education in itself. The attitude of mind habitually adopted by the investigator is the one that not only leads to the advances of knowledge, but also develops his own inherent intellectual powers and enables him to apply his store of knowledge with success to new or old problems that press for solution. The promotion of such an attitude of mind in the intellectual products of the University is a matter of the greatest importance for the welfare of the State.

Real culture includes within itself an appreciation not only of intellectual values but also of social virtues. A truly cultured man has no use for dogmatisms, fanaticisms or unreasoning beliefs or prejudices of any kind. A University ceases to be a temple of learning and becomes a breeding place for the microbes of ignorance if it lends itself to the propagation of the religious antagonisms and of the communal jealousies that disfigure the public life of our country at the present time. A University should, above all things, be a place where personal

ability and personal character are alone the passports to success, and a broad tolerance enables men of divergent views to work together for a common cause. If our Universities are animated by such ideals, they will prove a much more potent power for the building up of a great nation than Congresses and Councils, and solve the problem of the future of our country more effectively than Leagues and Legislatures. It is my earnest hope that the younger generation of University-trained men will in this matter have a saner outlook than our self-constituted political leaders. It is to you that I look to see the country set on the high road which leads to national honour and regeneration, and not on the wrong turning which can only lead to national humiliation and decay.

No Convocation Address can be complete which altogether avoids the political issue. There is no denying the existence to-day, both in British India and in Indian India, of political unrest. There is, however, no better tribute to the wisdom of the administration of His Highness the Maharaja than the fact that this problem is much less acute in Mysore than elsewhere in India. It is often suggested that unrest is due to education and will disappear with a restriction of educational facilities. I entirely disagree with this view, and believe that the real cure for unrest is an extension of education and the provision of special opportunities for those qualified by special energy, intelligence and ability to advance knowledge, to promote its useful applications and thus add to the national efficiency and wealth. On the broader issue of national self-determination, I will suggest to the young graduates of this University, and to others in a similar position elsewhere, that if we wish men of other nations to respect us and yield to our wishes,

we must learn to respect ourselves and make ourselves worthy of respect from others. We must abolish slothfulness and self-indulgence, and substitute in their place a mentality that recognises the highest form of human happiness to be that which is reached by labour and self-restraint. We must put aside a spirit of defeatism and put in its place a spirit that glories in the overcoming of obstacles. We must learn to appreciate and use the products of Indian labour, however imperfect they may be. We must acquire by labour and thought the secret of craftsmanship which lies in meticulous attention to detail and the continual striving after perfection. We must refrain from copying the vices and expensive habits of other countries and never forget that alcohol and nicotine are the deadliest of poisons known to humanity. Finally, we must never forget that the strength of our people depends quite as much on our women as on our men. The richest rewards are the fruit of labour, study and thought. Self-determination will come, but we must prepare ourselves for it. It is no use asking for freedom if we are not prepared to pay the price for it.

Graduates of the Mysore University, it has been my privilege during the past few years to come into intimate contact with several members of your University, both teachers and students, and to learn to appreciate their zeal and enthusiasm, and the valuable contribution that the Mysore University is making towards the promotion of sound learning in Southern India. I have been very fortunate during the past few years to have been able to welcome a number of students from Mysore to my laboratory at Calcutta and the ability and industry they displayed was a credit not only to themselves, but also to their teachers and the training

they received in your University. Some of them even displayed striking originality and capacity for research, and it is a matter of great regret to me that lack of financial resources prevented me from inducing them to continue their researches at Calcutta beyond the stage of the Master's Degree in Science. I have, however, endeavoured to be of service to such men in procuring for them a suitable career in life. I know also that students from Mysore who have come to Calcutta to study other branches of science besides physics have won the warm admiration of my colleagues in the University by their capacity and zeal. All this reflects the highest credit on your *Alma Mater*, and it is my earnest hope that you will resolve in your future career to serve her interests as best as you can. I join with your teachers in wishing for you a prosperous and successful career in life according to your respective abilities.—Farewell.

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THE PSYCHOLOGICAL ASPECT OF DRAWING

By

Mr. BEPIN B. BANERJI, B.A., B.T.,

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It must certainly have been observed by many that children at a particular stage of their life spend a part of their time in making fantastic figures of men, animals and objects. Very little children may not make even a remote approach to anything like a definite shape in what they draw, but they will go on scribbling whenever they find any writing material to practise their inestimable art. With the growth of both physical and mental powers, these scribbles may clear up into well-defined outlines and forms and though the drawings of the small children at any stage of their life may not, in any sense of the word, be perfect, they, however, most unmistakably show the inborn tendency of their mind to cast mental pictures into physical moulds.

It has been said that drawing is natural to children just as writing is natural to them. This does not appear to be a fact. Writing is nothing but a combination of the strokes, curves and straight lines which the children have such a natural aptitude to scratch and scrawl. Writing is thus a natural effect of drawing. Drawing is thus not on a par with writing but the progenitor of it; speaking may rather lay claim to the distinction attributed to writing. Drawing is as much natural to children as speaking.

The principal aim in teaching drawing is to enable the pupils to see correctly and to reproduce accurately any given object. It is the physical representation of what may be called a mental object. The first condition

of drawing is, therefore, that the object to be drawn must have a very clear and vivid impression on the mind. This will facilitate the physical aspect: the deeper the impression, the more accurate is the drawing. Drawing is thus both a mental and physical study, inasmuch as it demands the use of both the hand and the mind at the same time and is thus quite different from either reading or speaking. Reading or speaking may be effected without simultaneously calling into play both the mind and the body—but drawing, in order to be successful, must always demand an exercise of the two. It is, in fact, reading by the mind and writing by the hand both forms and colours.

The subject that affords such a valuable all-round training should have an important place in the curriculum. But strange to say, it is day by day pushed to the background, while studies which tax the brain and encourage cramming are brought to the forefront. Children may be spared a little of your history, geography and even the teaching of literature, such as is practised in many schools nowadays, to make room for this important subject so that not only the mind but also the hand may have a healthful training of the right sort. If there is any crying need in the country at the present moment, it is the need for a technical education. The flood gates of the University may be opened, as they have been opened, and legions of graduates may be manufactured in the course of a single year, but that will not save the situation. Society does not require men with lack-lustre eyes "poring over miserable books" and limping through life with faltering steps "sans eyes, sans teeth, sans everything." Men with stouter liver, tougher muscles and surer mode

of thinking are the "only thing needful." The country is universally agricultural, there are plenty of resources which may be turned into account, if only the highly intellectual type of education of the present day be a little leavened with what may be called an industrial or technical element. That drawing will be able to effect all these is not what we mean—our contention is this, that a healthful beginning may be made through drawing to simultaneously afford both mental and manual training.

That the attainment of an aim—such as is outlined here—must necessarily be gradual is an obvious fact. The pupil must complete both his visual and executive accuracy in order that drawing may come up to the required standard of excellence. They must acquire a clear impression of the object to be drawn, before they can make any attempt to translate it into definite forms. The drawing from a model is not an exception to this rule—here though the pupils are afforded the opportunity of having the objects constantly in view, a very clear idea of them must first be conceived before they can be transferred to the canvas. To effectually carry out these two functions is no doubt a question of time, and the teacher must be very patient to go through the scheme. At first his attention may be directed to drawing in outlines. A clear outline will show a clear understanding and the retention of the several parts of the object in mind. The mind of the child should not at this stage be divided between grasping the object and the expression of it in form and colour, in light and shade. This may be deferred to a later stage of the child's career. The principles of proceeding from the greater to the less, *i.e.*, from greater size to smaller size, from positive to less positive

colour, should follow the same order. The latter should by no means be attempted at the first stage of the child's education. This will confound his understanding. Let him first have a clear idea and let him express it in rough sketches which may with the growth of the manual capacity be elaborated into clearer shape and hues.

As the main object of drawing is the translation of mental pictures into physical ones, the less the drawing from copies the better. To draw from copies is to eliminate the mental vision and, as such, defeats the end for which a course of drawing is prescribed in schools. On the other hand, drawing from geometrical models and such objects as candle-extinguisher, jar, etc., may be encouraged at the initial stage. Children must be taught to apply the knowledge derived from them in analysing and representing more complex natural objects into the forms in which these shapes enter.

But to realise the aim of drawing to a still further extent, children should be practised in memory-drawing. The subject for such drawing may be gathered from something studied during the ordinary lesson or from an object shown to the class for a few moments. It should be noted here that this kind of drawing, though very useful in all other respects, labours under a serious difficulty; in case the visualisation be not exact, the drawing is likely to be unfaithful. To avoid this, the teacher must have, so far as possible, a clear knowledge of the visual capacity of the children under his care and measure his time for the exposition of the object accordingly.

In the next stage, the attention of the teacher should be directed to the drawing in forms and colours and in light and dark. This will, besides affording valuable mental and manual training, enable the scholar to

cultivate the aesthetic side of his nature. He will have to perceive the beauty of form and colour, if he wants to be faithful in his representation; such perception will naturally lead to appreciation—which will again prompt the learner to seriously study the beautiful in nature and analyse those seen in the past. A beginning may be made in this direction by comparing the curves of growing and living objects with the curves of ornamental objects and structures. Beauty of form should also be similarly taught by comparison of the colour of the natural objects with that of the artificial decorations, etc.

Another end to which the study of drawing may be very fitly appropriated is the cultivation of the inventive powers. A child does not rest satisfied with reading and writing; he naturally tries to convert them into the art of original composition. In the same way a child who knows how to draw will try to give shape to the contents of his imagination. He will try and produce something in drawing out of his own inventive powers. This may be called the highest and the most important end of drawing—in fact its ultimate goal. The severest demand will be made on his mental faculties for the production of this type of drawing. There is no model, either present or absent, to guide the pencil of the artist. Every touch will have to be fashioned from out of the recesses of his own mind and laid into the drawing in such a way as to make it symmetrical and appealing. Pure abstractedness is the only ground on which he stands and converts it into pure concreteness. From one extreme he runs to the other, and his power lies not only in his conception but in its transference to the canvas. Nobody has seen the *Madonna*, but Raphael's representation of her with the child in her

arms will vividly picture to the mind the strength and pathos of a mother's love. That immortal painting is a clear reflection of the author both as an artist and as a man. It bespeaks his religious fervour, his affectionate heart as well as his fidelity and freshness in transforming the wealth of his imagination into visible and tangible forms. All the gods and goddesses of the world are nothing but a fervent imagination materialised into concrete personalities.

All that can be done to enable the scholars to acquire manual activity from a course of drawing is to emphasise the necessity of repeated exercise. The scholars should be sufficiently drilled in it, and though to acquire facility from such repetition of practice is mainly a question of time, it is time well spent and beneficially exercised. What enormous improvement the muscles, particularly the muscles of the fingers, are capable of acquiring, will be clear from the fact that an expert artist can move the tip of his brush by $\frac{1}{10000}$ part of an inch. A good shot aiming at a bird at the distance of several hundred yards may move the muzzle of his gun even through a shorter space so as to ensure the bullet striking the head and not the breast to which it was at first pointed. So a clever painter may, with one single little stroke of his pencil, curve out a feature that becomes the wonder and admiration of the world. The muscles are thus capable of acquiring an extreme delicacy and fineness just as the mind is capable of being trained to perceive and retain the nice distinction between shades of colour and features. And the only end of drawing is to secure this extreme delicacy in the training both of the mind and of the hand. When a fine conception corresponds to a subtle touch, then all

that is sought from a course of drawing is fulfilled.

Another purpose to which drawing may be applied is to utilise it in lessons on nature-study, biography, wood-work, elementary science, history and the practical application of arithmetic and handwriting. The reproduction of a river course or a mountain range, a natural object, a historical scene will not only improve the capacity for drawing but it will also make a deep impression of the subjects from which the drawings are to be executed. By treating these lessons as outlined above, a physical turn will, as it were, be given to mental subjects, and so an appeal will be made to as many senses as possible for their proper understanding. By reading aloud, say a historical piece, the eye, the ear, the tongue and the mind are called into play and when in addition to this, the piece is also brought out in drawing, the tactual perception will help and complete the totality of impression to be acquired.

Drawing is thus a material transformation of a mental vision. At first it takes the form of mere scribbling, but with the training of the retentive and tactual powers, this scribbling may turn into a wonderful production of art which is creditable to the drawer not only from the aesthetic but also from the psychological standpoint.

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"NOTES AND MADE EASIES."

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Mr. C. S. KRISHNA IYER, M. A.,

(Asst. Master, Govt. High School, Chickballapur.)

I BELIEVE that I am not far wrong when I say that the leading educationists all over the world are against the practice of encouraging boys to mug up Notes. No good teacher with a sincere love for the technique of his profession would ever care to countenance these. The Departments of Public Instruction in several provinces and Indian States deservedly condemn the practice by issuing circulars against their use. Yet what strikes one as a great mystery is that the fondness of our students for such books goes on increasing day by day. Though there are thousands of such books on the market, (in History, Geography, Science, Logic, Economics) if a new one is written, customers are not wanting even for that new publication. It is true that there are all sorts of Notes—good, bad and indifferent; and that our boys invariably choose, as if by intuition, the right kind of book suitable to them, and do not encourage the mediocre ones. But even these languishing ones do find a sale now and then. The explanation of the mystery seems to me to be simple enough. What we care for most in our life is not knowledge but a pass in the examination. It is indeed a pity that we have given (and continue to give) such a predominance to this examination (or shall I call it the monster that sucks up the life-blood of our youths) that a large number of students have no other aim than to scrape through the examination. They sacrifice their wealth, health, energy, time, in short, everything precious and great, just to escape the ordeal.

Then again, man, by nature, is lazy and very very disinclined to work. His motto is maximum benefit with minimum effort. Perhaps, the tropical climate of our land has made us a little more indolent. That is why every student in our land has an inborn tendency to go in for Notes in all subjects, because he believes it to be a short-cut. Rather than wasting his time by laboriously plodding or wading through bulky books of very many pages, he always chooses the simpler "guides." Further, it is also a fact that some of these text-books, written by foreign experts, are written in a style that cannot be easily understood by our youths; hence it is they display a special taste towards some of these analytical guides, written in simple style, with the sole object of a pass in examination. Even in class rooms, the majority of our students clamour for "Notes" and the teacher who dictates to them plenty of Notes, be it in English or History, is a "good teacher." True, now and then, there is some grumbling, but it must be noted that this grumbling is not against the Notes as such, but against the painful process of copying. If some philanthropic teacher takes it into his head to distribute among his students free a brief summary of his day's lecture, I feel certain that he will become immensely popular with his students. Thus, it is clear that the so-called Notes mania is a deep-rooted one among our students. Since the authorities, the parents, the public, the managers,—all judge the efficiency and ability of a teacher or a lecturer (even a professor) by the percentage of passes in his subject in the public examination, the teachers too (however much it might be against their conscience or professional etiquette) have to stoop to these popular devices of the day.

There is then another aspect of the problem. Most of our teachers in High Schools and Colleges find it terribly hard to keep their body and soul together with the meagre pittance they get as their salary. While it is an open secret that there is ample scope for 'tips' or 'extras' in every other department, the only way of supplementing his poor salary, open to a teacher, is by taking up private tuition or taking to the writing of Notes. That is why we find some of them coming forward with their widely-advertised "Made Easies" and "Companions." By working hard for a few days in the vacation, he practically earns rest for the whole year; he passes for a capable teacher among his students; (that is more important than the remark made by his boss in the report, after a hurried inspection of his work for a few minutes, once a year or so); he gets some extra silver; very often, the high percentage of passes in the examination enhances his reputation. All these are certainly advantages which more than compensate the deterioration of morals, if any.

Let us now examine the question from the students' point of view. There are teachers and teachers and it is quite possible that in a particular school, the teacher of a particular subject may be indifferent or inefficient (for nowadays, the members are recruited to this profession not on the sole ground of intrinsic worth, but on extraneous considerations such as communal claims, kinship with the Chairman, etc.) Some managers in their over-enthusiasm for running their institutions as economically as possible, manage to get in very cheap hands, forgetting the obvious truth, cheap and nasty always go hand in hand. What are the students of this High School to do? There is no other way open

to them except the one of depending upon the Notes of some capable teacher of a different High School.

By this let me not be understood, even for a second, as an advocate of these Notes. On the other hand, personally I am dead against it and for some of the following reasons:—

(1) The Notes system does encourage the habit of "cramming" and thereby gives no scope for honest and independent thinking on the part of the boys; and if in the public examination a few questions that test the thinking power of the candidates do appear, these boys who have been exclusively depending upon their Notes fare ill.

(2) The tendency of the Notes-maker being to earn as much money as possible, he cares very little for the get-up of his book. In order that the cost of the book might be the lowest possible to him, he entrusts the work to some 2nd rate press, and the book consequently abounds in all sorts of spelling and grammatical mistakes. As the users of these books are the students below the average, they will not at all be in a position to correct them. Hence there is a probability of the students committing the same blunders in their answer books too.

(3) Boys who make use of the Notes fail to pay attention to the teacher in the classroom. This is certainly a great drawback, for the living word being more potent than the cold print, even the words of an ordinary teacher have great effect.

(4) Making things for the boys "too easy" or "spoon-feeding" them is psychologically defective. There should be a reasonable amount of obstacle to be overcome. Boys master a thing more thoroughly and retain it for long, when they themselves solve it.

A good training in the habits of thinking is quite indispensable, even in student days, for success in later life; and by supplying our boys with such guides and made-easies, we are making them lifelong cripples, unable to stand on their own legs.

(5) Perhaps the greatest harm done by the Notes is the premium, as it were, given to the habit of laziness. We deny our youths the opportunity of enjoying the best literature of a language by drinking at the fountain-head itself. The improvement in one's style, by reading books in original, is undoubted and real, though imperceptible at the beginning.

To sum up, though there is scope for a moderate use of some really good books, written by competent and experienced teachers and printed in a decent press, the indiscriminate production and use of such books are to be put a stop to. Further, no average student who cares for equipping himself with knowledge, will ever care to go in for these, however excellent they might be. Lastly, the best way of discouraging their use in our schools would be (i) by choosing men who are really fit for the post of teachers, (ii) by bettering their prospects, and (iii) above all, by laying less stress on examinations and degrees. The entire outlook of the public, as a whole, on this all-important demon, examination, must undergo a radical change.

OUR SCHOOL PLAY-GROUND

By

Mr. S. RADHAKRISHNAN, B A., B Ed., S.P.A.,
Bapatla.

THIS title is likely to call up to our minds gay pictures of a school eventide redolent of youth and merriment. Our thoughts fondly-cling to the bustle, the excitement, the fun and the frolic that lend an air of romance to the cricket field, the race course and the tennis lawn.

The whole day long we sit impatiently at the school desk chafing at the boredom of the pedagogue and longing intensely for the hour of deliverance. All of a sudden the peals of the school bell break upon the solemn stillness of the school, full and resonant. It is the time for play and lo! how we stretch our limbs, take in a deeper draught of air and plunge headlong into the stream of life that floods the playground. There is a smile on our lips, a spring in our steps and a freshness in every limb. We run, wrestle, scamper and stroll as we please. Excitement is in our blood, the nomad is resurgent and our hearts are replete with the unvoiced harmonies of Nature. Temporarily, life, death and that vast for-ever are woven into a grand sweet song.

Slowly the golden streaks of light begin to glimmer and fade in the west. The hours so winged with delight pass away all too quickly into the womb of darkness and night. So wears on each day to golden sunset and then on to the stillness of twilight when the wind sighs, and the trees nod and the song of birds dies away. Then follows 'the mystery and silence of night when Nature holds the spell of a wondrous enchantment.' So runs our life tale—a forest brook bubbling through sunshine and darkness.

It is a wise and thoughtful saying which calls the playground the uncovered school-room. We may venture a step further and assert that it is the school itself and in that School of Nature what things we may learn should give us pause.

We are all agreed that in the play-field we are schooled under the canopy of heavens in the completest atmosphere of freedom and felicity. We are no longer cribbed, cabined and confined to the four walls of a class-room and a freezing curriculum of studies. Our lives are not cramped with the pedagogic nostrums of 'do this' and 'do that'. We shuffle off though once during the day all vestiges of school routine and rigmarole that cling to every brick of our class—the time-honoured birch, the stentorian voice and revolting didacticism.

Thus viewed as an adjunct and an auxiliary to the regular work of the school, the playground marks a transition from the Old to the 'New Education' loudly talked of at present. The 'knowledge-mongering' theory of education was at first too prevalent to be shaken and the public had an almost Red Indian belief in the marvels that could be worked at school. The authority of Max Muller is sufficient to prove that the school formerly signified 'a stopping place where sorcery was practised.'

It is refreshing to the spirit to leave behind these blighting theories, 'the paraphernalia of books and shibboleths' and step into the University of Nature, which we may term as 'naturalism' in education without committing ourselves to any of the extreme characteristics attributed to it by Rousseau. In the words of Oscar Browning 'naturalism' is only an attempt 'to build up the nature of man, to educate first his body, then his character

and lastly his mind.' The 'educand' is all the while exposed to the skyey influences and to the marvels of Nature and is being brought into the attitude that looks from Nature up to Nature's God. The same idea is expressed by Wordsworth who raised the worship of Nature into a religion and a cult. His exhortation borne on the tides of time, rings in our ears 'come forth into the light of things, let Nature be your teacher

Knowing that Nature never did betray,
The heart that loved her.'

In the same breath he sings of the impulse from the vernal woods, which teaches us more than all the sages: the sounding cataract, the tall rock, the mountain and the deep and the gloomy woods, their colours and their forms which to him were an appetite and a passion and of beauty born of murmuring sounds. To him the meanest flower, shrub and stream bore a message. Our lives thus nurtured by Nature find tongues in trees, books in the running brooks, sermons in stones and 'attain that blessed mood in which the burden of mystery, the heavy and weary weight of all this unintelligible world is lightened'.

There is a great diversity of opinion on the nature of the 'educand', a desideratum of the utmost importance for education. Some hold that he is as a little angel who 'comes trailing clouds of glory from heaven which is his home.' Others obsessed with the theory of original sin represent him as a truant and a roprobate, deceitful above all things and desperately wicked. Yet another theory, the product of recent psychological researches, endows him with a treasury of possibilities, which they call congenital predispositions. They go on to maintain that these innate

tendencies and instincts lie at the basis of all education, which thus amounts to a modifying, regulating and furthering process of this innate inheritance of the individual.

It is not necessary for our purpose, nor is it relevant to mention all of them, but we may consider at short length the play instinct which is characteristic of childhood. The opinion of Adams is weighty and worth quoting on this point. He says: 'It is the very essence of childhood that there should be play.' In the opinion of Karl Groose, "the child does not play because he is a child but is a child in order that he may play." Some regard this play instinct in childhood as a preparation for the future. If for instance, a child plays mother to a doll, a kitten pursues a ball of string and a calf waves its head in the air, it is nothing short of anticipating their respective callings in life in the future. We may take these theories on play for what they are worth, but they are important as emphasising its importance in any attempt to educate the young. It is here that we begin to appreciate the wisdom of Froebel's 'Kindergarten' which continues to be a practical elaboration of the pliant figure which has won its way into proverbial philosophy and educational theory.

It is ever a saying of my respected Guru, Mr. T., that the playground is not simply a muscle and blood building institution but a quarry where our spirits are touched and our conduct moulded by lessons begot of personal experience. At first I could hardly realise what my Professor meant, but after a considerable lapse of time and a sufficient input of experience on the playground, his words have become too true to be exaggerated.

For one thing we are brought face to face with the hardness of reality, which compels

us to meet any unexpected situation with consummate adroitness. There is little of unreality and vagueness in our efforts on the playground. We are not merely spectators: we are also actors with a part to play. We cannot escape from action, from the constant exercise of our will. We have continually to choose whether to do the work ill or well, whether to excel or not to excel. We must once for all make up our minds whether we will stand up to a fast ball at the wicket, or run away from it, whether we will play up hard in a losing game or give up in despair. Once got into the ground "we enter into innumerable relations with our school fellows and teachers and realise consciously or unconsciously that we have voluntarily or involuntarily to adapt ourselves to various unwritten customs and traditions of behaviour." In Plato's striking metaphor we become dyed with the colour of the society in which we are steeped. We learn through an unnumbered series of acts the spirit of fairplay and good cheer that laughs at danger and whistles under defeat. This is the spirit of sportsmanship. It is comprehensive and pervades every nook and cranny of our existence. The essence of pulling together at the rope or the oar, the respect to a fallen rival in a joust or a tournament, the spirit of fellowship and comradeship which prompts us to burning deeds in the trenches or the battle-field, in the thick battery smoke or burning sands, the proverbial cup of water willingly given amidst the din of Zutphen, the mythical friendship of the Grecian Damon and Pythias, the magnanimity of a monarch on the banks of the Jhelum and the other innumerable acts of kindness and love are all lessons of the playground. Herein lies the silent touch of Nature which makes the whole world kith and kin.

We can no better conclude this plea for a greater and better use of the playground than by reiterating the fact that it is architectonic to education. We need not be over critical on this point but let us note the soundness of the principle on which it is based. There is a greater need at present than at any other time for a truer breed of sportsmen, who may make the little corner of the world in which we live a brighter and a sunnier place to live in. The world may thus be prepared for universal peace which will

"Lie like a shaft of light across the land,
And a lane of beams athwart the sea."

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SUGGESTION AND ITS PLACE IN EDUCATION

By

Mr. T. J. BHOJVANI, M.A., S.T.C.D.,
*Dy. Chief Officer, Karachi Municipality,
Karachi (Sind.)*

IT is an undeniable fact that a human mind is so constituted that it acts upon another. Hypnotism, mesmerism and other allied sciences rest upon this psychological truth. The more powerful mind is able to influence the less powerful one. This fundamental fact we find being practised consciously or unconsciously in the universe, and orators, statesmen and leaders of mankind take advantage of the knowledge of this fact.

A thing is suggested to the human mind and it begins to think of it. The hypnotist suggests something; he, by the force of his will, projects an image, and the "subject" is forced to think of that. Nowhere is this truth better illustrated than in the seething sea of human beings swayed to and fro under the emotion of the moment. It is because the orator by his powerful will has suggested an idea. After the death of Cæsar, Brutus addressed the crowd suggesting that the cause was just and he was hailed; the next moment Antony by his powerful suggestion turned the human minds to the thought that he (Cæsar) was a martyr.

The nurse, the doctor, the philanthropist and the preacher, all require the help of suggestion. The human mind is pliant and it can be raised from the darkest depths of misery to the top-most heights of beatitude, from the weak vacillating condition of the child to the firm and powerful state of man and *vice-versa*, and all this by way of suggestion.

A good doctor or a good nurse is able to cheer up a patient and he soon recovers. It is the suggestive personality of the nurse which helps the cure. It is for such a nurse that a patient looks longingly, and follows her with his eyes, as she goes about in that house of sickness with a smile and a cheerful word for all.

So also a philanthropist goes about among the poor, comforting *them* and cheering them. He goes about shedding light in those abodes of darkness, putting spirit in the depressed people.

The preacher in the same way helps the fallen. He comes across a human soul who has sinned and despairs of salvation. The 'God's good man' tells him that "glory lies not in never falling but in rising every time we fall". He tells him that there are great possibilities of good in him, and the man takes heart again, and begins life anew.

That old nursery story of how a pack of wily boys made a teacher ill, shows the force of suggestion. Briefly related, a teacher was never known to fall ill even for a day and the pupils longing for a holiday thought of making him ill. So, the next morning when school sessions began, a boy went up and told the master that he was looking unwell. The master sent back the boy with a reprimand, though he felt uneasy.

After some time another boy got up, and told him that he looked very much pulled down. The two suggestions put together began to work, and when after some time a few more boys repeated the same thing, the teacher took leave on account of head-ache, and went home with fever. How powerful is suggestion!

When the mind of an adult is thus influenced, the possibilities of suggestion in the case

of children are great; because children are more 'suggestible' than adults, the most suggestible age being up to nine. All the children are more or less suggestible and the teacher should be cognizant of this fact.

One of the first to extend the idea of hypnotic suggestion to the personal influence of the educator was J. M. Guyan, and Keatings applied the term in a wider sense.

The most successful method of suggestion is exhortation. The teacher exhorts his pupils to do a particular task. Their likes and dislikes are modified by suggestion. Locke says that tasks otherwise arduous and even repulsive can be made to look inviting, if the teacher insinuates that the work is easy. Here the force of suggestion is called in. The cunning boy who divided his labour of white-washing a fence by telling the other boys that the task was for privileged persons and required great skill, showed knowledge beyond his years. The mother who pretends to taste the medicine and says 'how sweet,' thus persuading her child to drink it off, follows this psychological truth.

Often-times will a teacher come across a boy trudging along on his wearisome path of remembering a poem, or mastering a theory. The poor child feels miserable and if the teacher cheers him and tells him that he will certainly succeed, the child's labours would be considerably lightened.

Another boy hates a particular subject, and thinks that he will never be able to learn it. The teacher's exhortations will soon set the matter right.

A boy does a wrong. The teacher knows it, reproaches him but at the same time tells him that there are great possibilities of good

in him and that he will surely improve. This will be very efficacious.

Often-times will a teacher encounter a boy with some special aptitude. He should take such a boy in hand and arouse him. One knows not that he knows, and many times the hidden sparks of genius lie embedded till some one discovers them and fans them to flame. The teacher should always see that no sparks die out on account of his negligence.

But in order that suggestion may be potent, the utterance should carry conviction with it. A teacher does not employ suggestion if he has an argument. We cannot prove to a boy who is wanting in initiative and self-confidence that he can exert himself, but we can show to him that we believe in his capability of doing better. This is 'suggestive transmission' of belief to kindle desire and stimulate effort. A German writer says: "Assume that your boys are as good as you want them to be and instil that belief in them."

Suggestion works indirectly by example. A teacher by a particular line of conduct is suggesting the same to his boys. There is something akin to personal fascination here, and suggestion is specially powerful when backed by authority, when it comes from one to whom we look up.

Thus a teacher should go about helping the boys in their troubles, raising the fallen, cheering the downcast and encouraging the steady. For this he wants great cheerfulness, inexhaustible patience, honesty of purpose, firmness of will and strength of belief. The children should feel his strong and suggestive personality, his sunny presence and be confident that under him nothing can go wrong with them.

THE TEXT-BOOK COMMITTEE.

By Mr. Ch. V. JOGARAO, B.A.,

Maharajah's College, Vizianagram.

OF all the branches of the Directorate of Madras, the activities of the Text-Book Committee exercise an influence of no small magnitude in the field of educational authorship since the encouragement of authors is entirely in their hands. The departmental regulations prescribe that books to be used in every type of educational institutions shall be chosen from among the list of books approved by the Text-Book Committee; that no school may use a book not included in the list; and that any school which does so is liable to forfeit its recognition. Clauses to this effect are incorporated in the Educational Rules and the Grant-in-Aid Code as well as in the Regulations controlling every class of educational institutions. So far as I know, the deliberations of the Text-Book Committee are of a highly confidential character and conducted in a way not consistent with the spirit of an enlightened age like ours. Those authors are, of course, fortunate whose books happen to appear in the lists of approved books; and the rest must thank their own stars since their productions stand condemned for all school purposes. Authors may not even know why their books are rejected; and what is worse they are not allowed to explain the merits and claims of their productions before the Text-Book Committee. In the eyes of criminal law every man is honest until the contrary is proved and established in a court of law. But authors who devote their lives to educational and literary progress and their works which are meant to improve education or disseminate knowledge, stand condemned unless the contrary is graciously recognised

by the Text-Book Committee—and all this without a notice to the party nor a hearing from him. We thus see that authors are meted out a treatment worse than that accorded to criminals. To speak the truth, this state of things amounts to be nothing short of a national calamity since the present day procedure of the Text-Book Committee offers such heartless treatment to authors and their publications.

As a matter of fact, authorship in our country is a rare gift; and at the same time a sorry trade since the reading public forms but a scanty minority due to widespread illiteracy and other well-known causes. However worthy a book may be, its publication is not likely to pay the cost of printing, not to speak of a surplus to encourage its author. The only market for authors lies in the educational field and when entry thereto is controlled in the fashion described above, authorship turns out to be a crime; and this state of things must be responsible for the lack of good school-books of indigenous production.

There is one curious point about it. The books approved by the Text-Book Committee are classified under three categories: 'For Libraries,' 'for Teachers' Use,' and 'for School Use.' The first two of these are meaningless since nothing can stand in the way of keeping a book in some corner of a school library, and since it cannot be obligatory for schools to keep every such book in their libraries. Those assorted 'for Teachers' Use' are also in the same position since no teacher is bound to look into the books so approved by the Text-Book Committee; nor is there anything to preclude him from looking into a book not so approved. The third class 'for School Use' is the only one that counts for anything. It is really impossible

to know what considerations weigh with the Text-Book Committee in classifying the books under these three heads. Books for teachers' use are written but rarely, *i.e.*, books on teaching methods and educational questions. If such books are placed in the Teachers' lists there can be some meaning for the course. Again many books which are glaringly meant for students and class purposes are relegated to the other lists. From all this it appears that these two categories were invented just to show off an empty sympathy for authors and books outside the pale of departmental favour. Otherwise, it is impossible to divine any earthly purpose in these two categories.

Again, in the matter of books bearing on teaching methods and involving questions of a controversial character, there is the danger that, if members of the Text-Book Committee happen to be imbued with false and unwarranted notions, the judgment exercised by them will, in all probability, prove detrimental to educational progress in the country and may do more positive harm than good. I am aware of instances of the kind, but I refrain from referring to them here in a general article like this and for want of space. In this connection, I should like to invite the attention of the Department to a statement of opinion made by the Calcutta University Commissioners and reiterated in *The Times Educational Supplement*. They say: "State action and State supervision are necessary as factors in educational policy; but they should leave a wide margin for the exercise of free initiative even at the cost of what may seem to be a waste of energy and some disregard of the intellectual standards accepted as authoritative by the expert opinion of the time."

This clearly indicates the undesirability of leaving questions of a controversial character to be decided according to the whims of a solitary individual or two. In these circumstances it is quite possible that they would be encouraging those books which are irrational and useless; and likewise prohibit those others which are really rational and beneficial. As matters now stand, there is nothing to prevent undesirable decisions of this kind. For this reason the Text-Book Committee will do well to refer such matters to a select committee of experts, and institute a judicious discussion to be conducted in an open meeting along with the author concerned. A procedure on these lines will surely lead to some good in the matter of educational methods.

From the foregoing discussion it is clear that the activities of the Text-Book Committee amount to be a matter of patronage or prohibition without any sort of constructive work before them; and I should like to point out the desirability of rendering its activities more fruitful by way of bringing out and welcoming set books of the right kind. In order to set right all these defects and render the activities of the Text-Book Committee more rational, judicious and humane, it is necessary:—

1. That the three-fold classification of 'approved books' should at once be done away with; and there should be but one class of 'approved books.'
2. That the deliberations of the Text-Book Committee should be open to the public.
3. That no book presented to the Department should be omitted from the approved list without giving reasons for the course and unless and until the author is given due notice of the objections and heard fully.

4. That there should be published a separate list of books rejected by the Text-Book Committee, giving reasons for the course.
5. That the Text-Book Committee should have a constructive programme before it and work accordingly.
6. That, in dealing with books bearing on teaching methods of a controversial character, the Text-Book Committee should organise special committees and have the questions discussed at full length in conjunction with the authors; and a judicious pronouncement made one way or the other.
7. That complete and consolidated lists of books, both approved and rejected, should be made available for sale at the Government Press.

We are asked to publish the following by the Inspector-General of Records, Gwalior Government :—

INDIAN HISTORICAL RECORDS COMMISSION.

GWALIOR SESSION MANAGING COMMITTEE.

BULLETIN No. 2.

The Gwalior Darbar have been pleased to invite the Indian Historical Records Commission which is to hold its sessions at Gwalior in December next. A Local Committee has been, therefore, formed to make the visit of the Commission a splendid success with the following as its members, namely :—

1. Sardar Madhav Rao Baba Sahib Phalke.
2. S. R. Bhagwat, Esq., Inspector-General of Records.
3. B. R. Tambo, Esq., Registrar of Education.
4. M. B. Carde, Esq., Superintendent, Archaeological Dept.
5. M. Saquib Sahib, Persian Professor, Victoria College.

G. B. Makoday, Esq., Secretary of the Committee, to whom all communications should be addressed in this connection.

PUPILS' LEISURE AND THE CULTURAL ASPECT OF SCHOOL LIFE.

By

Mr. S. ANANTHA NARAYANAN, B.A., L.T.
Inspector of Schools, Pudukottah State.

THE first question put by the ancient kings to their ministers as soon as they assembled in Durbar was about the general condition and welfare of their subjects, their health, happiness and prosperity. The first query of the Headmaster to his clerk on entering school is whether all the masters are present or whether there is anything wrong with anyone. The reason for his anxiety is not far to seek. If a clerk is absent for a day, his work can be allowed to lie over and accumulate till his return or it may be distributed among other clerks who may or may not be responsible for its disposal. It is not so with the teacher; for he has to deal, not with written or printed sheets, or dead material but with children and young men teeming with life and overflowing with activity in every sinew, limb and movement. In the words of Longfellow 'they are living poems while all the rest is dead'.

A teacher's absence at school, although it be for an hour or two or even his coming late by about a quarter of an hour if not more, is a source of great hindrance and an awful nuisance not only in his adjacent class-room, but in the whole institution, as well. The noise the students make till somebody is thrust in is indescribable. I say *thrust in*, because it is in most cases pressure and authority that weighs down the helpless teacher since refusal to comply with the instructions contained in the 'scrap of paper' may be meted with all that indiscipline deserves. Nor does the uproar subside even after the appearance of a teacher on the scene.

The principle of selection of men for this seemingly unavoidable routine work is to look up the abstract of the masters' leisure chart and anybody with a breathing space of a period at least is pitched upon, and summons issued which the poor teacher dreads and tries to avoid as ignorant and frightened villagers do in respect of Court summons or the bearer thereof. The arrangement contemplated in sending some one to engage the class is to keep them at work and thus silent.

An engagement teacher's task is none too smooth or easy and his difficulties are numerous. What useful work is a man going to do when work is extracted from him out of pressure and he is unwilling, or when he is jaded with the day's work, thus being deprived of the respite that is his due and right? It must not be forgotten that he has to blow out with his lungs which only those with experience can understand, and the growing exhaustion hour after hour and especially towards the fag end of the day's work will not certainly make him take such vampiric mandates coolly however calm his temperament may be at other times.

The engagement teacher or lecturer is usually given very short notice of the nature of the work he has to do and often he has no time to prepare anything. He has to face an audience of critics and if he is intent upon keeping them silent, he has to be chattering and rattling on topics ranging from almost nothing to everything whether the student listens to him or not. If he does not shout, the students become the masters of the situation dividing themselves into 'dumvirates and triumvirates,' thereby converting the class-room into a market place and causing more noise than there would be if there were no teacher at all to control them. The student

takes no interest even if the conscientious engagement teacher continues the trend of the lessons taught by the absent master since he fully knows that he is sure to be taught the same over again. But there are very ridiculous instances of sending substitutes. Sometimes a history assistant or lecturer is sent to engage a class of advanced mathematics students or a mathematics or science teacher to handle a class of advanced history students and in these days of specialisation in water-tight compartments one can well imagine the bungling the lecturer will make to the fun and laughter of his auditors if he begins to talk on the subject of the hour with nothing of previous preparation and no opportunity of knowing at what stage the previous lecture has been suspended. When several class-masters find much difficulty in maintaining discipline with the sets of students whom they meet daily, what should be their hardship in holding under check pupils they very rarely meet in the year and whose names even they do not know? The mischievous student well knows that he can violate with impunity the code of etiquette with such teachers as are afraid to approach the head of the institution lest he should pronounce a verdict of incompetence, and this is one of the reasons for the prevalence of indiscipline in schools and colleges. The poor man's lot is worse when several sections are combined into one which is also one other expedient adopted under such circumstances.

Let us turn to the other difficulties that confront the engagement teacher who is only a 'flying bird'. The necessity for the teacher to be constantly bellowing or blowing out has been already pointed out. In case he takes it into his head to let the students alone, and on occasions when the student is

not interested in his empty discourses, the result will be to his own detriment. The student will never remain idle and the noise and bustle consequent on his inactivity will bring down the peon with a warning slip from the head of the institution or the head himself with his strong and authoritative indictments about the incompetence of the teacher in the presence of the students themselves, if the so-called head is headless or boorish. Under such circumstances the helpless teacher awaits the ringing of the bell to release him from the ordeal box, for so we may call the platform whereon he sits. Verily it is a relief for him to get away from this unpleasant task at the earliest opportunity.

Again it must be imagined what untold havoc such an intrusive work causes on the regular and legitimate duties of the teacher. This becomes an intolerable nuisance to the teacher when managements counting on the gains they make, do not fill temporary vacancies under the pretext of non-availability of suitable hands. Strain on such trivial occasions tells on the regular work of the teacher which he cannot but shirk to some degree; for after all he is a human being subject to physical laws. Very often he finds his intention of consulting reference books and journals for the purpose of supplementing his preparation at home where such facilities do not exist, thwarted by this mandate of his superior, its effect being a diminution in the quality of his work.

A sufficiently clear exposition has been given of the evils attendant on this system. The student feels discontented for he is almost shut up as it were in a pen and made to endure the boredom if the gentleman in charge is a strict disciplinarian. The 'scholars' would fain study as they list whatever

interests them and whatever they have need to prepare, if left to themselves under the conditions pointed out below. The teacher feels it irksome; the head of the school is uneasy. With a view to eradicate the natural shortcomings of such an arrangement, I would suggest the following steps for adoption in our schools and colleges:—

Our educational institutions are proverbial for their spoon-feeding and the administration of predigested preparations in connection with the examination ordeals. The outlook of the present day student here is not the acquisition of knowledge, or the assimilation of culture but the easiest way to obtain his 35% of marks or the marks qualifying for a pass whichever is less. The students are generally not much interested in events and movements taking place round them. To encourage them to soar beyond the pale of their examination courses and make them useful members of society, it is better to equip them with the rudiments of such general knowledge as can be gleaned from papers, periodicals and other current journalistic literature. In other countries such new processes and novel methods as the Dalton Laboratory Plan, the Project Method and similar developments as make the pupil the central pivot in the educational system are being experimented upon and utilised in the cause of education. Bearing in mind these transformations, it is not too much to ask our young men to improve and perfect themselves by affording them opportunities of free access to the Library and Reading Room. Such idle hours may be availed of for training the students in the choice and use of books which will stand them in good stead later on in life when they can pursue this hobby to their own betterment and edification. It is a

pity to see so many so-called educated people not knowing how to make the best of their leisure time and in fact of life itself.

To suit this purpose the library must be located in a spacious hall capable of accommodating all the students of the school or college, if need be. It must further be equipped with a good number of volumes, care being taken to provide several sets and copies of books most appreciated or often needed by students. Well-constituted class libraries also will serve the purpose of engaging teacherless classes under the control of the monitor. When lecturers or teachers are absent, the respective classes may be directed to go to the 'common study hall' where someone, say, a tutor or a demonstrator or a librarian will be in charge and engage them in silent reading.

The library and the way it is utilised in most schools are very unsatisfactory. The principles guiding the issue of books may be said to be on a par with the lottery system and the student knows nothing of the contents of the book; nor has he even the remotest chance of ascertaining whether the book will satisfy his requirements. The pupils must be allowed free access to the library in batches of five or more and permitted to handle the books and select not from the catalogue but from the volumes actually on the shelves, in the presence of the librarian himself.

The librarian must not merely be a ladder-climber or one who can spell and read the numbers and names of the books but must be qualified enough to guide the students in the choice of the relevant and suitable books when his advice is sought for, which implies that he must himself be a man of vast reading. He must be a whole-time librarian and not a clerk-librarian as the case generally is or drawing and drill instructor-cum-librarian.

Many educational institutions have not got sufficiently commodious halls to enable the students who have no work or are free from work to meet together. Providing for such halls is indirectly helpful in promoting a sense of fellow feeling, comradeship and an *esprit de corps* so invaluable for the progress of any institution however humble it may be.

Another useful way of spending such tedious hours will be to give the students practice in speech-making. I know that even in schools extolled to the skies in other respects, this side of school work is entirely omitted, and neglected wholesale. Education is an all-round development of the individual and the power of clear exposition is a gift which must be cultivated early in life to be able to bear fruit in good time. How many people do we see who are men of stuff and mettle but are miserable talkers like 'Poor Poll' as was once said of Oliver Goldsmith. My suggestion is that these spare moments may be taken advantage of to train our young men in the art of public speaking and also in the art of dramatisation. Further they may be permitted to elect their own presidents or chairmen from among themselves under whose control they will be. This will be much appreciated by them as it gives them practice in some sort of self-government, a somewhat glorified name for self-control and combined action.

Other means of diverting these students are not wanting. They may also be sent to the manual training section of the school. Students interested in carpentry will take to it of their own accord; students having a taste for weaving will while away their time at it; painters and artists among students will stick to their work like leeches and it will be a matter of some difficulty to make them forsake their work at these for the next hour or class, provided they have been properly initiated into them. Schools not equipped with such costly courses may turn the students out into the school garden, where they will find enough occupation. During the evening last hours, they may be dispersed quite early and sent into the sports ground to be under the charge of the captain, if it is feared that they will slip away.

These suggestions are not absolute but must be adopted at the discretion of the head of the institution or in consultation with the general inclination of the students.

THE TEACHING OF LOGIC—II.

By Mr. K. R. SREENIVASA IYENGAR, M.A.
(Continued from page 433 of July issue).

IV.

WITH definition, division and classification, the student will have mastered some portion of the ground which is in the nature of preparation of the material to be utilised in Logic proper, namely, inference, both deductive and inductive. The discussion of the nature and kinds of propositions must be taken up, however, before he can go on to inference. But just at this point, there arises a question in the mind of the student which must be satisfactorily answered before he can appreciate the significance of the logic of inference.

The question is: why do logicians so frequently make use of S's and P's in all possible ways of permutation and combination, and make an unintelligible technique of what may be stated in a few simple concrete illustrations? If this is the crude way in which the problem strikes the student beginner in Logic, it strikes no less the mature psychologist (E. G. Spearman) who considers that judgment has "been radically disfigured by being forced into the old formula, 'S is P.'" (The Nature of Intelligence, etc., p. 277).

Is there any answer to this question on the basis of Formal Logic? Why indeed should there be such a plethora of seemingly unintelligible language in it?

That the procedure of Logic in casting all judgments into the general form $S \rightarrow P$ is no mere outgrowth of a decaying science, but is woven into the very fabric of Logic as a science which deals with thought-processes can be abundantly proved by comparing Logic with Algebra in this respect.

The science of Algebra largely makes use of symbols in its operations. The square of any number, for instance, is obtained by applying the general formula

$$a^2 = (a + b)(a - b) + b^2;$$

which is applicable to all numbers. Thus:

$$68^2 = (68 + 2)(68 - 2) + 2^2$$

$$65^2 = (65 + 5)(65 - 5) + 5^2$$

$$84^2 = (84 + 4)(84 - 4) + 4^2 \text{ and so on.}$$

The outstanding feature in these examples (and others of their nature) is that they are all thrown into the same form which is expressed in the formula above quoted. The formula, then, is a symbolical expression of the general form to which all numbers (whose square is desired) may be thrown for easy manipulation, irrespective of the particular contents in each case. Without limiting us to any particular case, it enables us to deal confidently with all cases. Algebra thus emphasises the forms into which numbers can be thrown and is, in this sense, a formal science. Consider now the following propositions:—

(1) If scarcity of rains always produces famines, then famines are sometimes caused by scarcity of rains. If wars always result in the depopulation of countries, then the depopulation of countries is in some cases due to wars.

(2) The ideal of the free-love in marriage always ends in divorce. The Indian ideal of marriage does not end in divorce. Therefore the Indian ideal of marriage is not that of free-love.

The first two propositions can be thrown into the form: If all S is P, then some P is S. This means that wherever we have a proposition which can be put into the form $S \rightarrow P$, we can deduce a proposition of the form, some P is S, or all cases where S is P are cases where some P is S. The third proposition can be generalised in this manner. If all S is P, and M is not P, then that M is not S. That is, wherever it is known that all S is P and a particular thing before us is not P, then it necessarily follows that that thing is not S.

Propositions, then, can also be thrown into general forms and the point of it all lies in the fact that the formula enables us to make sure that if an argument, by taking a particular form, becomes valid and gives us a right conclusion, then every other argument, by taking the same form, must also give us a right conclusion. If a particular argument by taking a certain form, does not give us a right conclusion, then either the form itself is invalid, to begin with, or the argument has not been properly expressed. All reasoning, that is, has a formal side which it is the business of Logic to investigate and study. Syllogistic Logic, in fact, is an attempt to disentangle this formal side of reasoning from the particularities of case and context, distinguish correct from incorrect forms, study their nature and laws of operation, etc. In all propositions of the same form, certain features are exhibited, certain consequences follow; and these propositions can be better studied, if their general form is mastered.

For this purpose, then, it is enough if the forms are expressed by symbols like S, M, and P (or X, A, Y, as in Algebra), which stand for some intelligible aspect of reality whose character it is unnecessary to specify any further. For our main object is to study the forms into which our various concrete judgments can be thrown, and this can best be accomplished by omitting all irrelevant

considerations, that is, irrelevant to the form of the reasoning. If Logic always dealt with concrete illustrations in its attempt to discover the laws of correct thought, the chances are that it would be hampered to a great extent by matter that is purely irrelevant. This then is the justification for employing symbols in Logic. For instance, the argument that if all S is P, and all S is M, then all M is P, is a bad (invalid) form, with the result, that every other argument thrown into the same form would be likewise invalid. (E.g., all good citizens are ready to defend their country. All good citizens are persons who vote regularly at elections. Therefore all who vote regularly at elections are ready to defend their country).

"Poverty is the vice of India, because its millions are without an occupation during six months in the year"; starting with the judgment (expressed as a proposition), the kinds and characteristics of the terms constituting it have been studied; the mutual relations between the subject term and the predicate terms have been noted; the precise significance of the terms has been discussed; it now remains to see what is the significance of the whole proposition which has thus been analytically studied, and what inference it is capable of yielding either by itself as a single proposition or in conjunction with other propositions. It is not necessary in a first year course in Logic, as it is unnecessary in the present article, to enter into a detailed investigation into the nature and epistemological characteristics of judgment. But it is necessary to point out why we come to make judgments at all, and how they are going to be utilised in Logic. We make use of judgments when we want to realise the significance of a certain situation in relation to our

practical life. Some situation or some aspect of a situation strikes us as important in serving as starting point for thought or action in the given circumstances. And this situation or aspect of a situation we express by means of a concept and in the form of a judgment. In the words of Russell (*op. cit.*, p. 46) "to define a situation by means of a concept is to make a judgment." "When a burglar, trying to get into a house, notices a window unbolted, and says, 'there is an unbolted window' or 'that window is unbolted,' he is defining, by means of the concept 'unbolted window,' that aspect of his situation which will enable him to proceed....." "Unbolted window" is the aspect of his situation on which the burglar seizes, because of its value for him—it helps him out of his situation. Likewise when I say that "The room is hot" or "the horizon is dark," the room-being-hot and the horizon-being-dark are concepts by means of which I am trying to characterise situations which should serve as centres from which to start in thinking or acting. Such characterisations or definitions of given situations in practical life are judgments. In the language of Dewey, every judgment is a "case of trying to clear up intellectually a doubtful situation." "It is not a case of spontaneous combustion." (*Op. cit.*, p. 102).

Judgment, then, (as all thought, in fact), arises out of the necessities of practical life and Logic only tries to formulate in clear language (as propositions) the different types of such judgments and to discover their characteristic features. Logicians have classified judgments into three main kinds: categorical, hypothetical, and disjunctive: "Categorical judgments assert a fact directly, hypothetical judgments assert a fact under a

condition, while disjunctive judgments assert an alternative." The quality and quantity of propositions must be clearly explained and the whole topic of the distribution of term must be shown to follow as a necessary consequence of a particular interpretation of the relation of subject and predicate in a proposition, *viz.*, the class inclusion view. It must be pointed out that though this is the general mode of interpretation adopted in Logic, Formal Logic is not necessarily committed to this view and that the attributive view is equally applicable to the theory of syllogism.

Of what significance are judgments for Logic? How is Logic going to utilise them? This is the question of questions in Logic—it relates to the subject matter of Logic proper, *viz.*, inference. A judgment by itself, be it ever so meaningful, would be of no value for Logic, unless it can lead to something beyond itself. Doubtless a judgment is in many cases itself an inference. It represents the result of a process of thought which has already taken place. It is already a conclusion. It is a decision. But this is a sense in which the judgment is used to signify a concept. In the words of Dewey the judgment "closes (or concludes) the question at issue" and the result is embodied in the form of a concept (*ibid.*, p. 107). Concepts accordingly, are themselves the result of a certain amount of thought activity, of judging, and they serve as starting points for fresh judgments. A good judgment (or concept) is based on a number of other judgments which make it intelligible, which state the grounds or reasons upon which it rests, or the conclusion which it helps to support. Both these aspects may be combined, and we could say that the two significant characteristics of a judgment are (1) that it is based on grounds,

and (2) that it has consequences. It is the elucidation of these two aspects or characteristics of a judgment that leads to inference.

It is in such elucidation or elaboration of judgments, in drawing inferences—that Logic is primarily interested. The rest of the whole of Logic is only so much preparation of the material, an auxiliary process, in relation to such drawing of inferences. As I said above, a simple judgment has no place in Logic. It simply asserts a "brute fact" on the basis of sense-perception, as for example, "The champions won to-day in the foot-ball match," "It rained cats and dogs yesterday."

Even in ordinary, unscientific thought, however, it is really a matter of grave doubt whether we ever make such isolated acts of judgments, whether we are ever satisfied with merely asserting a matter of fact. It is not then quite correct to say that judgment is the unit of thought as a certain school of modern logicians seems to hold. (*Vide, e.g.*, Creighton's "An Introduction to Logic," Ch. XXI). Thought is always inferential, consciously or unconsciously. Hence, inference or reasoning, in however crude and elementary a form, is the real unit of thought.

In Logic, at any rate in scientific thinking, it is clear that a judgment must always be expanded into the more complete logical form of inference. "Reflection," writes Dewey, "involves not simply a sequence of ideas, but a consequence—a consecutive ordering in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessors. The successive portions of the reflective thought grow out of one another and support one another—they do not come and go in a medley" (*ibid.*, p. 3).

Before proceeding, however, to deal with logical inference, it would seem desirable to

impress on the minds of the students the nature and necessity of inference. Thinking, it is easily seen, always arises out of the necessities of practical life. It is not a case of "spontaneous combustion," but is always a response to some doubtful situation or felt difficulty. Such a situation or difficulty always suggests some solution or way out of itself. It involves suggestion or the formation of a certain theory or hypothesis which will explain the doubtful or difficult element in the situation. In other words, all thinking involves a leap, a jump, from the known to the unknown. "The exercise of thought," says Dewey, "is, in the literal sense of that word, inference; by it one thing carries us over to the idea of, and belief in, another thing. It involves a jump, a leap, a going beyond what is surely known to something else accepted on its warrant." (*Ibid.*, p. 26).

"Suggestion is the very heart of inference; it involves going from what is present to something absent." The solution suggested cannot be immediately accepted, for there are rival suggestions possible to solve the same difficulty. It can only be in the nature of a supposition, guess or hypothesis, an idea.

The suggestion of a solution is itself an act of reasoning. Yet for clearness sake, it would be advisable to apply the term reasoning to the process of developing the bearings, or elucidating the implications, of a supposition or an idea tentatively accepted. Huxley gives an excellent example to illustrate all these processes in a concrete act of thought.* Suppose that a person, "on coming down in the morning to the parlour of his house, find that a tea-pot and some spoons which had been left in the room on the previous evening

* Quoted by Russell

are gone—the window is open, and he observes the mark of a dirty hand on the window-frame, and perhaps, in addition to that, he notices the impress of a hob-nailed shoe on the gravel outside.” These are the given facts: they constitute a situation, a difficulty of practical life in response to which the person begins to think. The solution is suggested to him that somebody has broken open the window, entered the room, and run off with the spoons and the tea-pot. This is the suggestion or hypothesis tentatively entertained, we shall say. It has to be rationally elaborated or reasoned out with reference to the important facts observed. The idea of the window having been broken open is reasoned out on the ground that windows, once shut, do not open of themselves and the person therefore concludes that somebody has opened the window. Again it is certain that spoons and tea-pots do not go out of the room spontaneously, and as they are not now where the person left them, they must have been removed. Once more, the marks on the window and the shoe-marks outside bespeak plainly the presence of a human being, since no other animal, as yet known, can produce such marks or wear hob-nailed shoes. Lastly, it is not unlikely that some human being must have stolen the things, for previous observation and experience have taught us a general law—unfortunately, “a very universal and unimpeachable one”—that some men are thieves. From all these premises, it is assumed that the man who made the marks outside and on the window-sill, opened the window, got into the room, and stole the tea-pot and spoons. The suggestion or hypothesis is an inference, the discovery of a new fact on the basis of certain others definitely known. It has been reasoned out systematically, and

as it happens to explain all the observed phenomena admirably, it may definitely be entertained as a theory.

An analysis of a complete act of thought, then, would reveal as the basal processes (1) experience of particular facts (observation and experiment) presenting a difficult or doubtful situation needing solution, (2) suggestion of solutions or hypotheses on the basis of past generalisations, (3) testing each hypothesis by deducing what would be the consequence or consequences if the hypothesis were true. As a result of this process, we should be left with only one successful hypothesis. (4) Verification (in certain cases) of the successful hypothesis by repeated experiment and observation. The processes are the same whether the case be one of ordinary life (as described above) or a problem, which the man of science pursues in the laboratory.

Thinking, then, is reading a meaning into isolated, fragmentary, discrepant facts which by themselves would simply puzzle and perplex the observer. The suggestion of a meaning (inference of a hypothesis) transforms these “brute facts” into an intelligible whole. This significant whole thus affords us a standpoint from which we could review the facts once more carefully and thereby substantiate the meaning tentatively suggested.

Systematic inference would thus appear to be a movement of thought “back and forth between facts and meanings” (“How We Think,” Ch. VII). I have already said something about the differentiation between deduction and induction in a previous connection; it needs, however, now to be pointed out that all inference and reasoning, all reflection in short, is both inductive and deductive at once. The movement of thought from the fragmentary facts to a meaning, the suggestion

of a possible explanation, is inductive; that from the meaning back to the facts so as to grasp their relation to one another and to additional facts to which the suggestion may have directed attention, is deductive. The suggestion of a meaning, of “connections binding isolated items into a coherent single whole,” involves in scientific or logical thinking, the formulation of a definite principle, or, the use of a universal. The observed data would then appear as premises of reasoning, and the final resulting belief, a logical or rational conclusion.

“While induction moves from fragmentary details (or particulars) to a connected view of a situation (universal), deduction begins with the latter and works back again to particulars connecting and binding them together. The inductive movement is toward discovery of a binding principle: the deductive toward its testing—confirming, refuting, modifying it on the basis of its capacity to interpret isolated details into a unified experience” (*ibid*, p. 82).

Such is the nature of systematic inference. “To draw inferences,” says Mill, (“System of Logic,” Introduction, Section 5), “has been said to be the great business of life. Every one has daily, hourly, and momentary need of ascertaining facts which he has not directly observed: not from any general purpose of adding to his stock of knowledge, but because the facts themselves are of importance to his interests or to his occupations..... It is the only occupation in which the mind never ceases to be engaged.” And, as Dewey comments upon this passage (*op. cit.*, p. 18), “what a person has not only daily and hourly, but momentary need of performing, is not a technical and abstruse matter; nor on the other hand, is it trivial and negligible.....

Just because, however, it is an operation ofreaching belief indirectly, it is an operation that may go wrong as well as right, and hence is one that needs safeguarding and training.”

It will be seen that our examination of the nature of inference has brought us to the same conclusion which we reached previously in regard to the necessity of elaborating judgments. A good judgment, it was there pointed out, is based on a number of other judgments which make it intelligible, which state the grounds upon which it rests or the conclusion which it helps to support. And an elucidation of these two aspects was said to be inference or reasoning. A good judgment, a judgment (or decision) about a situation, is the suggestion of a meaning, a hypothesis, the formulation of a ground, support, connecting link or universal principle in relation to the facts of a situation (induction); the elaboration of its consequences is the application of the principle to its development in every one of the facts originally observed as well as subsequently suggested by the principle (deduction). We have thus by a double method penetrated into the very heart of Logic.

As exercises in practical thinking, the students may be asked to analyse any of Sherlock Holmes' adventures or similar concrete stories. It will be seen that an analysis of such a story involves all the steps or stages which we have noted in the analysis of a complete act of thought. There is first a problem given, a mysterious crime or some inexplicable occurrence, etc.,—which needs solution and which is the practical stimulus for thinking. The powers of keen observation and watchful scrutiny are brought into play at this stage. Then a number of hypo-

theses is entertained claiming to solve the mystery, some of which explain a larger, some a smaller, number of facts: this is the stage of suggestion, of inductive generalisation. Next the deductive development of the consequences of each suggested hypothesis follows. According as these deductions agree or do not agree with the facts observed, the hypothesis becomes successful or proves a failure. Finally verification of the successful hypothesis by other hitherto undiscovered clues follows in some cases. Indeed there is nothing which makes us cautious, "skilful" thinkers, acute reasoners, or critical observers, like the study of some great concrete, human problem; the institutions of social life, the desirability of reform in some of them, the value of some proposed legislation or some new movement, etc. The study of Logic should be made concrete by exercising the mind in such living problems. Or the analysis of some of the famous experiments which have led to brilliant results in the field of science may be taken up for the purpose. The present writer feels that the study of at least one positive science should be made compulsory for all Logic students while a systematic study of Logic—from the point of view of the analysis of thought-processes, especially of inference, should be made indispensable for all students of science. He also feels that Logic should form one of the courses of study for the secondary school as well, for a scientific study of conscious thinking—thinking which begins so early in human life—should begin as early as possible. And there the elementary processes of thought such as conception, judgment, inference, etc., may be illustrated from the ordinary text-books in the languages. Anyway, a critical, logical, sequential discussion or analysis of some prob-

lem or other—a logical essay, as it were—must be made a compulsory question in the Logic papers of the University standard. May I also suggest that a study of Logic be made compulsory in the training classes as well, at least for such of the pupil-teachers as have not had a previous course of study in that science? The value of Logic from the standpoint of education can hardly be exaggerated, and has been realised by almost all the great masters of education.

V.

I have been emphasising time and again in these pages that inference is the proper subject-matter of logical study, and the students must try to learn and appreciate this fundamental truth. It would give them a connected, coherent, systematic vision of Logic as a whole (both inductive as well as deductive) with all its other topics of study appearing in their proper perspective (as has been attempted to be sketched in these pages).

Inference then is the starting point as well as the *terminus* of Logic. Even unreflective thought is already potentially inferential. A judgment is an inference implicitly. Logic or scientific thinking only attempts to state this inference explicitly elaborating all its implications, the grounds upon which it rests (induction), the exact conclusion to which it leads (deduction).

If this nature of inference is once firmly grasped, the rest of Logic should appear quite intelligible and interesting. One of the notable features of the new Logic syllabus for the Intermediate Examination in Arts of the Mysore University is, that it has placed inductive inference before deductive, requiring the former to be gone through in the Junior Intermediate class, the latter in the Senior. This is as it should be and an innovation long

desired for by the Logic teachers. For inductive inference is in every way more concrete, and therefore more attractive and appealing, to the juniors and from the point of view of logical doctrine itself, ought to take precedence over deductive. For deduction assumes the truth of the major premises which it employs to infer particular truths. But how do we get the major premises themselves? And what is the guarantee of their truth? It is clear that this problem of Inductive Logic—of explaining the general by the particular—must precede the study of the deductive problem—of explaining the particular by the general.

I shall not, however, try to follow inference in its inductive aspect in these pages; I shall content myself with studying it as it is utilised in (usually so-called) deductive inference. The study of a complete act of thought involves, as we have seen, the study of a judgment in both its aspects.

Deductive inference, then, is the process of developing a judgment—which represents a meaning, a hypothesis, an idea, a universal or general principle, in relation to a particular situation—into its consequences; testing it, so to say, or exemplifying it by asking: assuming tentatively its truth, how do (present as well as other) facts get related to it, what import do they obtain therefrom? It presupposes the observation of a situation and its facts; it presupposes the informing of the situation with a meaning (the general or universal principle); it only asks: what, if this meaning be true, would be the significance of the facts? What, if it be true, would be the other consequences? "Deduction is the elaboration (of facts) into fulness and completeness of meaning." Such being the nature of de-

ductive inference, it is clear that the so-called immediate inferences are properly no inferences at all, since in them no situation is given which requires solution, nor any real transition of thought involved. They are usually treated of in Logic text-books immediately after the study of propositions and prior to that of the syllogism. An immediate inference is an inference to which a judgment gives rise immediately, *i.e.*, by itself, without the intervention of other judgments. What a judgment reveals by itself can be nothing else than its own meaning. From 'no men are infallible' we can infer (it is said) that 'no infallible beings are men.' Inference requires, however, that there shall be a real transition from one group of facts known to another fact or group of facts unknown (not necessarily new or novel, but something of which the observer was not quite aware to begin with), that at least the conclusion reached shall be different from the starting point. Judged by this standard, it is clear that there is neither a real transition of thought nor a different conclusion reached in the process of immediate inference. The proposition inferred is only the result of a verbal interpretation of the original one, and restates it only in different language. Still, the process is not entirely verbal but involves, according to Creighton (*op. cit.*, p. 99), a certain movement of mind, a fuller and clearer realisation of the meaning and bearings of the original proposition. Hence he designates the process 'the interpretation of propositions'—a name which appears to suit it better than 'inference' or 'eduction.' "Whether or not they may properly be called inference," continues Creighton, "they render important service in helping us to understand all that is really implied, both in the way of affirmation

and denial, in the proposition we use. Nothing is commoner in argument than disputes as to what certain statements imply—what propositions, “amount to the same thing” and may therefore properly be substituted for any given statement. Now it is the purpose of the methods of logical interpretationto determine what other statements, positive or negative, are really involved in the case of the different forms of logical proposition.”

This then is the *rationale* of the several processes of immediate inference or direct interpretation of propositions: opposition, obversion, conversion, contraposition, and inversion. Given the truth or falsity of a certain statement, they enable us to say what other statements we could possibly make both about the subject and predicate of the proposition in respect of their quantity and quality. Whatever be the inferential value of such a process, there is certainly no question about the disciplinary value (for the intellect) of such interpretation of propositions. Exercises of the following type should certainly set the mind of the student on edge:

(1) If proposition O be true, I may be true; if I may be true, A may be true; if O be true, A may be true. Examine the argument.

(2) Criticise the following:—

Granted that it is true that All wise men are mortal then, No wise men are immortal, and No immortal beings are wise men. Hence it is false that Some immortal beings are wise men and that Some immortal beings are not unwise men. But if this is false, it must be true that All immortal beings are unwise men and that Some unwise men are immortal beings.*

* Taken from Creighton's Logic.

The process of drawing out all the implications of a proposition granted to be true or false sometimes serves as a *reductio ad absurdum* in that it draws to limelight any discrepancy, false assumption, hasty generalisation, or other kind of fallacious element latent and remaining unnoticed in the original proposition.

I now pass on to deductive inference proper where instead of a judgment giving rise to an inference by itself, it does so in conjunction with other judgment or judgments. How it becomes possible to draw an inference from such a combination of propositions and how different combinations give rise to different inferences will be considered in the remaining part of this section.

The artificial manner in which the syllogism is usually interpreted at present as consisting of two premises and a conclusion engenders many doubts and difficulties in the mind of the student who cannot thereby appreciate the true nature and range of function of this type of reasoning. For as Spearman remarks: (*op. cit.*, p. 291) “if one looks at the actual course of thought as exhibited in writings or conversation, the syllogistic form—even as dealing with characters instead of classes—appears to be surprisingly infrequent. An indubitably genuine specimen is quite hard to discover.”

Though the three-propositional form constitutes an important characteristic of the Aristotelian syllogism as traditionally handed down to us, it is not an altogether indispensable requisite: the Indian syllogism, for instance, has five members and that correct inferences are drawn from such arguments shows that the three-membered syllogism is not the type of all syllogisms. In fact, it is a common experience that in many of our dis-

cussions in ordinary life, we sometimes use less than two premises to draw valid conclusions. It must be impressed on the minds of the students that irrespective of the number of premises used, a good deal of “usually subconscious” syllogistic reasoning is constantly going on in our minds. Every concept that we are familiar with supplies major premises whenever we come across with an object that can be subsumed under the concept. Thus according to Spearman (*op. cit.*, p. 292), “when a chemist learns that a certain substance is made of ‘glass,’ he thereby obtains information, that it is not only hard and transparent, but still more inevitably, a combination of silica with some alkali. The physician similarly brings at least to the background of his cognitive field a mass of relational awareness so soon as he observes that his patient has a ‘wiry’ pulse or a ‘dull’ lung.”

The formal three-membered syllogism of ordinary Logic is only an explicit statement of such subconscious syllogisms. The significant feature of both kinds of syllogism is the use of a universal principle or idea. We say that in deductive inference, we have a particular situation, a set of given facts, and the suggestion of a meaning or hypothesis to account for the facts. The significance which facts would obtain if the truth of the hypothesis is provisionally assumed, the consequences to the facts, so to say, is what we wish to infer in this form of reasoning. Now the major premise in a syllogism represents this universal principle or idea, this concept, or this meaning suggested in relation to the facts; the facts themselves take the shape of the minor premise; they are the data observed whose exact meaning we wish to discover. And the conclusion of a syllogism

represents the meaning or truth of the facts which they come to possess, when read in the light of the universal principle whose truth also is in a way thus tested and confirmed.

To illustrate from the example given by Dewey on page 69 of the work referred to in these pages: there is the phenomenon of a long white pole bearing a gilded ball at its tip and projecting nearly horizontally from the upper deck of the ferry-boat on which the person is daily crossing the river. What that pole signifies—what purpose it serves—is the problem to be solved. Several hypotheses suggest themselves to the person who begins to test them one by one. As many syllogisms could be constructed as the number of hypotheses suggested. For instance, could it be an ornament?

(1) What is common to all the tug-boats cannot be an ornament. (Universal principle: major premise).

This long pole is common to all tug-boats (datum observed: minor premise).

Therefore this long pole cannot be an ornament (conclusion which gives a definite meaning to the long pole in so far as it is now proved to be not an ornament).

Could it be the terminal of a wireless telegraph?

(2) Terminals are always placed on the highest part of the ship.

This thing is not placed on the highest part of the ship.

Therefore this thing is not a terminal.

Could its purpose be to point out the direction in which the ship is moving? A syllogism could be constructed to prove that this is the case.

Of course the major premise in all such cases does not simply state the universal principle as a concept, but defines it positively

or negatively, *i.e.*, by stating some characteristic which it happens to possess or not to possess, as the case may be. Now it must be noticed that both the concept and the particular feature predicated or denied of it may serve as points of comparison in the syllogism. A technical phrase—the “middle term”—is very freely used both in the class-room and in the ordinary text-books on Logic in this connection, but what its exact import is—what purpose it fulfils—is not often made clear. The middle term is so called because it mediates the conclusion and is the middle bond of union connecting the premises. Inference, we saw, is always by means of some identical link or connecting thread which our thought suggests in relation to a particular situation. In the second of the above examples, the thought was suggested if the long pole could not be the terminal of a wireless telegraph. Terminal is the suggested concept. The major premise states this concept along with one particular feature of it, *viz.*, that it is always placed on the highest part of the ship. The act of inference is now easy and simple. If the long pole be a terminal, then it should naturally be placed on the highest part of the ship. Since observation shows that it is not so placed, the long pole is inferred not to be a terminal. That is, the long pole—the observed fact, is compared with the terminal—the suggested idea in this particular feature and found to be not agreeing with it. This feature, then, of the terminal, serves as the principle of comparison and is therefore the middle term. If the long pole does not possess this particular feature which is possessed by all terminals, then it is assuredly not a terminal.

This then is the essence of all syllogistic inference. The major premise always contains

a concept and some one of its features. The minor compares the observed fact (minor term) with either the concept itself or its feature specified which accordingly, as the point of comparison, is known as the middle term. The remaining term is called the major term.

And according as it agrees or disagrees with the one (the middle term), its agreement or disagreement with the other (the major term) is inferred, and *vice versa*. This is the reason why the middle term is said to occur twice in the premises. It occurs first (in the major premise) either as the concept or its specification. Then it occurs again (in the minor premise) as the point of comparison with the minor term. To use empty schema: all A is B; X is not B. The minor tells us that something is not B. The major tells us that if it is not B, it is not A. Hence X is not A. Again, all A is B; X is A. The minor tells us that something is A. The major tells us that if it is A, then it is also B; hence X is B.

Comparison, then, of an observed fact with either the concept or its specified feature is the general principle. Care, however, must be taken to see that the comparison is instituted between relevant and identical universes of discourse, lest otherwise the danger of “undistribution” should arise. This danger may arise in either of three forms according as the minor or the major, or the middle term happens to be “undistributed” in the syllogism. To take the case of the undistributed middle.

(3) Certain fat-salaried beings deserve to be abolished. Professors are fat-salaried beings.

Therefore Professors deserve to be abolished.

The rational explanation of this fallacy is as follows:—

In syllogistic reasoning we infer, in the conclusion, the connection or want of connection of the observed fact with the concept or its specified feature. The inference, as common logic tells us, must be necessary, *i.e.*, follow inevitably: any person of ordinary intelligence should be mentally constrained to draw that conclusion and no other. It is evident that in such a case the comparison of the fact with the concept, for example, must be of such a character that it must hold true of every instance of the concept that may be imagined. In the above case, for instance, the concept “fat-salaried beings” is not taken in its universality in either premise. It is not meant to say that *all* fat-salaried beings deserve to be abolished, or that professors constitute the *whole* class of fat-salaried beings. So that professors might conceivably fall under the class of fat-salaried beings who are excluded by the specification and who, for aught we know, do *not* deserve to be abolished. In this case, therefore, the conclusion would be invalid, because not necessary. Again, suppose that the comparison of the fact is with the specified feature of the concept. The feature specified then needs to be a necessary or fundamental feature of the concept, or at any rate one which is always present wherever the concept is to be met with, for the simple reason that only in such a case would the agreement of the fact with the feature give us any justification for inferring its agreement with the concept also. If terminals are not always (or necessarily) placed on the highest part of the ship, then, the fact that this pole does not happen to be so placed is not warrant enough to enable us to conclude that it cannot be a terminal. In

like manner has the fallacy of undistribution of the minor and the major terms to be understood.

A firm grasp of the above principle of syllogistic inference would render the comprehension of differentiation of the figures easy, for it would make it intelligible. At present such differentiation is explained in ordinary text-books by referring to the position of the middle term in the premises: if the middle term is the subject of major premise and the predicate of the minor premise, the argument is in the first figure, etc., etc. But the student is left to wonder why the middle term thus hops from place to place and comes to possess such ubiquitous importance like one of those “famous” actors in South Indian Dramatic Troupes who are put down to appear in multifarious casts in the same drama, now as the hero in one scene, now as the servant in another, now as the buffoon in a third, etc. And the notes-writers on Logic, out of mercy for the student perhaps, devise all sorts of curious and ingenious phrases and sentences to help him to remember the particular positions of the middle term in the particular figures. The rational explanation of the figures is as follows. Ordinarily, all reasoning is conducted only in the first and the second figures and the third and the fourth figures have no importance except for special and academic purposes, and the above account of syllogistic inference consequently applies properly only to the first two figures. Still it is not difficult to see how arguments could be constructed in these figures as well. Let us first consider the cases of the first and the second figures. If the minor term is compared with the concept of the major premise, its agreement or disagreement with the specified feature is

inferred in the conclusion, and we have an argument in the first figure. If the minor term is compared with the specified feature and its agreement or repugnancy with the concept is inferred in the conclusion, we have an argument in the second figure. Where, on the other hand, the desired comparison is brought about, not by starting with the observed fact (minor term), and explaining it in the light of the concept or its specification, but by a further characterisation of the original concept itself or of its specified feature, we have arguments in the third and the fourth figures. In such a case, therefore, it would appear that for the purpose of explaining the observed particular fact or situation, the statement of one hypothesis, suggestion, general idea, or a concept and its feature, is not enough. Let us consider an example in the third figure.

All whales are mammals

All whales are water-animals

Therefore Some water-animals are mammals.

The fact to be explained in this case is that of "water-animals." By what description shall we understand water-animals, or at least some of them? The explanation is sought for indirectly by the suggestion of the concept of "whales." We know that some water-animals belong to the class of "whales."

But all whales are characterised by being mammalian creatures; hence such of the water-animals as are whales must also at the same time be mammals. Instead of the minor term being compared with the middle term, the middle term itself is compared, as it were, with the minor term. Again in the fourth figure, it is a further characterisation of the specified feature of the concept which serves as the point of comparison with the fact to be explained. In, e.g., all truly brave men prefer death to dishonour; no one who prefers death to dishonour is capable of a mean action; therefore no one who is capable of a mean action is truly brave, we have the present fact of some unexpected act of meanness explained by remembering that those who prefer death to dishonour (a preference which is a characteristic of all truly brave men) are never capable of meanness (a further characterisation of the said feature); hence it is clear that those who are so capable can never be truly brave men.

The distinctions of figures, then, are based on real distinctions of relation, constituting appropriate forms in which our inferences concerning such relations can be expressed. Moods simply express the quality and quantity of the propositions constituting arguments in these figures.—*The Mysore University Magazine*, September, 1929.

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A MANUAL OF ETHICS, BY J. S. MACKENZIE, M.A., LL.D. (SIXTH EDITION). THE UNIVERSITY TUTORIAL PRESS). Price 9s. 6d.

To students of Mental and Moral Sciences, Mr. Mackenzie is well known as the author of several philosophical works. Though his writings in general are bound to be popular on account of his lucid style and analytic method of treatment, his best book is undoubtedly the Manual of Ethics. The first edition was published as early as 1883 after which many a valuable publication on the moral science has certainly appeared; still it must be said to the credit of Mr. Mackenzie that his book has not been easily excelled.

Mr. Mackenzie has however been revising his work off and on answering the criticisms levelled against him and now the sixth edition is just published. The work is so written that it is at once useful to the beginner as well as the specialist, whose attention is frequently drawn to more advanced works of different schools. While all the general ethical topics are presented in their historical setting and duly criticised, it is particularly interesting to note his opinion regarding the function of Ethics and its relation to Casuistry. There has been an acute controversy on this question between Bradley on the one hand who has violently denounced it, and Rashdall and Moore on the other, who defend it. The considered opinion of our author as expressed in the following summary will be acceptable to many a student of Ethics:—It cannot be denied that the expression of the moral law in the form of particular rules is a necessary stage in moral development. But when conflicts arise as inevitably they must, there would be wranglings regarding the scope and meaning of the commandments. Casuistry in such cases frames rules for breaking the commandments, thereby tempting men to justify to their own satisfaction any action. So it will be better for Ethics to fall back upon the

great fundamental law of which the commandments themselves are only fragmentary aspects.

The foot-notes and references are very valuable to advanced students.

HINDU EXOGAMY, BY S. V. KARANDIKAR, M.A. (TARAPOREVALA, SONS & CO., BOMBAY). Pp. 308. Price Rs. 6.

This book under the auspices of the Bombay University claims to be a systematic study of Hindu marriage outside the Gotra. While the paramount importance of the marriage institution is universally recognised, it is considered by the orthodox Hindus to possess in addition to its social and moral values a peculiar religious significance. Hence it is that Vivāha is considered as a Samskāra or a sacrament as distinguished from a mere social contract. The protection of this sacred institution by endogamous and exogamous restrictions has been laudably inspired by spiritual as well as sociological considerations.

The learned author of this book traces the evolution of marriage in its varied aspects in different races and communities with a view to show (1) that the modern restrictions (more or less universally accepted by all the Hindus from the Himalayas to Cape Comorin) of marriage alliances within the same Gotra and Pravara are later accretions on earlier and simpler forms of convenient rules of practical guidance and (2) that the Christian and Mussalman communities reveal a well-developed body, mind and morale in spite of contracting marriage alliances in what the Hindus consider as prohibited circles.

The author adopts a two-fold view in tackling this important problem. He approaches the question from the evolutionary standpoint, tracing the marriage institution to the very fountain of Hindu Scriptures—the Rig Veda, where he detects not only the absence of any direct or indirect reference to sept exogamy but also the prevalence of Sagotra marriage in ancient times. In ten successive chapters he traces the evolution of

greater and greater restrictions introduced by the influential Brahmins of the Brahmana, Sutra and Smriti periods, to keep up the purity and virility of their caste. This part of the study, interesting and instructive as it undoubtedly is, requires a good acquaintance with the literature of the Dharma Sastras and their commentaries, not to speak of the special mental aptitude to follow the peculiar Sanskrit technique freely adopted by the Smriti Kartas. It must at once be admitted that Mr. Karandikar has had the opportunities of this extensive study, though it cannot be conceded that his inferences are always logically cogent and that his interpretations bring out the intentions of the authors. It would have been particularly helpful to follow the author more intelligently if he gave in an appendix the originals referred to in the body of the text.

The controversial biological topics of inbreeding and outbreeding are specially adapted by the author to support his main purpose of giving a warning to the non-Brahmins who constitute the majority not to imitate the Brahmins in matters of marriage rules and regulations the adoption of which very much restricts the field of selection and brings about its concomitant defects. Strangely however there is the concluding advice "Back to the simpler rules of exogamy of Manu's days coupled with the instruction that the modern altered conditions necessitate the formulation of new rules.

The style in spite of the technical character of the problem is so clear and attractive and the references given are so useful that a close study of the work will amply reward the reader by stimulating further research.

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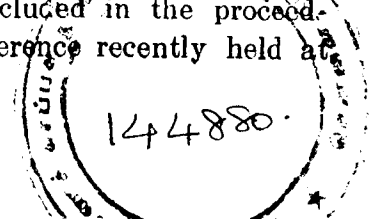
19-9-29.

The Educational Review.

The preliminary agenda which has just been issued for the ensuing Universities' Conference mentions several interesting problems relating to higher education in this country. Doubts have been expressed in various quarters regarding the utility of recent educational reforms resulting in the separation of Intermediate courses from University control and we are not surprised that it is one of the subjects to be discussed at the Conference. The problem of the unemployment of the educated middle classes has not yet been taken up for consideration with any seriousness by the Universities of India, but it is time that something was done in the direction. The increasing opportunities for the participation of the graduates of Universities in the Imperial and other services of the country have also brought in their train responsibilities of a serious kind and the subject of Universities and the Services is therefore rightly included in the list of subjects. The problem of waste in Indian Universities is another serious matter—out of the large number of students who enter the Universities, only a few emerge at the other end with degrees to their credit, a large proportion dropping out on the way. If the expenditure on University education can be concentrated only on those who are likely to benefit by it, there will be not only a considerable increase of efficiency, but also a great saving of finances so badly needed for educational expan-

sion at the present day. We should like to see what solutions the Universities' Conference will propose for this question. The formation of an All-India Advisory Board for Scientific Research was suggested even at the First Universities' Conference, but as nothing has happened about it in the interval, it therefore figures again in the agenda of the ensuing Universities' Conference. The organisers have wisely confined themselves only to a few subjects and we trust the discussions and resolutions on the various subjects will be found to be of considerable benefit to the members from the various Universities who will assemble at Delhi on the occasion.

One of the valuable ideas which the League of Nations has put forward before the civilised world is the teaching of International brotherhood through history whose influence at present is usually in the direction of teaching a militant patriotism highly injurious to the spirit of international goodwill. If the teaching of history should play a prominent part in the creation of an atmosphere of international peace, it can only be by teaching the subject from the broad standpoint of truth and not from the narrow standpoint of national triumphs. One of the aims of the World-Federation of Educational Associations is also the promotion of International peace and a paper on the subject, *Towards World Unity Through History*, was appropriately included in the proceedings of the Conference recently held at



Geneva. The author, Mr. Frederick Gould, wishes that the dating of history by dynasties or presidential periods should be dropped and the history of the mother-country should be told in association with world history. In the teaching of history he insists that the teacher should reveal the normative work of man in each period. In the early period, it will be an account of man's action on nature and in reaction to nature; in hunting, in agriculture, etc. Then comes the period of man's advance in industry in wheels, boats, hand-mills, etc. We have again the energizing of man in the fine arts, in poetry and general imaginative literature including myths and legends. There is the energy of man as displayed in science—the science which is born in primitive man's commonsense, in simple calculations of number, weight and measure, culminating in logic, astronomy, physics, chemistry and biology. The expression of human nature in social life and manners is another aspect to be taught. It may be news even to some members of the teaching profession that text-books have already begun to appear embodying some of these ideas and it will not be surprising, if in the near future there is a revolution in the historical manuals taught in our schools and colleges.

We are in entire sympathy with the views expressed by Mr. Littlehailes, Educational Commissioner with the Government of India, in the latest quinquennial report on Indian Education

with regard to the need for some central agency for the co-ordination of educational effort in this country. Education having become a transferred and provincial subject, there is a tendency for educational work to drift into various directions. The lack of uniformity of progress is not so serious as the ignorance obtaining in one part of India about efforts elsewhere. A knowledge of educational experiments made in various parts of the country should be helpful to every one associated with educational work and it is a pity there is now no arrangement except what is done under the auspices of the Inter-University Board and the All-India Teachers' Federation, for bringing educational agencies all over the country into mutual understanding. Under the present system, says Mr. Littlehailes, there is no all-India agency even to give information to the authorities in one part of India of what is done in other parts of India, far less to advise on educational problems or direct educational administration, notwithstanding the evident value to one province of the educational experiments in another province. He fears there is an actual danger that certain educational activities and experiments in the provinces will overlap to an unnecessary extent. Referring to the educational questions discussed by the Central Legislature, the report comments on the anomalies of the present position, according to which the Government of India is practically helpless in doing anything regarding education, though there is a

Department of Education, Health and Lands under its auspices :

These Legislatures have discussed the introduction of free and compulsory education, women's education, moral instruction, technical education, medical education, the education of the depressed classes and the education of Europeans and Anglo-Indians. The demand for improvements in the educational system in all its aspects has been repeatedly voiced in the Central Legislatures; but the Government of India, with its Education Department, has been unable to give any lead to India as a whole in educational matters of all-India importance except by drawing the attention of Provincial Governments to the debates which have been held in the Central Legislature and by the example of its control over the comparatively small areas under its direct control.

Demands have even been made for the provision of funds by the Government of India for the purpose of helping forward the movement for mass education, but under the Government of India Act the Central Government is prohibited from making contributions towards subjects which have been provincialized.

That a very real need exists for some form of central agency and possibly also for some manner of central advice or control can scarcely be denied, and for many reasons the changes that have taken place during the quinquennium are much to be regretted.

The present absence of any exchange of inter-provincial ideas and the lack of knowledge on the part of one province of what is happening in another province have been well illustrated by the necessity which has arisen of sending educational experts or committees from one province to another in order to appreciate the methods which

have been adopted in attacking particular problems, such, for example, as agricultural education in provinces where special experiments have been undertaken. Provincial Governments and the Government of India have to a growing extent felt the necessity of convening educational conferences for exchange of views between workers from distant parts of the country and for personal interchange of experiences gained under varying and not altogether dissimilar circumstances.

Among the subjects discussed in the Quinquennial Report on Indian Education for 1922—1927 is the awakening of interest in the

country in problems of Indian education. "Women in India," says the report, "through educational and other associations and through managing and advisory bodies are now taking a very real part in the endeavour which is being made on all sides to bring the education of girls in India up to at least the level which has been reached in the education of boys. It is taking a long time to break down the barriers of prejudice and of social customs, but it is now happily being recognised that one of the greatest essentials for the future well-being of the country and of public life is the education of women of all communities. In order to establish this belief it has been necessary to educate public opinion and public opinion is most speedily and best educated through the examples set by women themselves and by the propaganda work which has been done by corporate bodies of women all over India,

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Probably at no period in India's history have there been more hopeful signs for the future in regard to the education and position of women than at the present moment when the public demand for the education of girls and women is organized and vocal. This demand is being made not only by the women themselves but also by some of the enlightened men of the country who have realised that by educating a woman you are not merely educating an individual, but producing the means of spreading the results of education through a whole family."

We must congratulate the organisers of the Madras Library Association on the volume that they have just brought out on the *Library Movement* and on the work in the popularisation of Libraries in Southern India implied by it. The Rt. Hon. V. S. Srinivasa Sastri and Lord Goschen contribute brief forewords in the course of which they bless the library movement and hope for its gradual expansion in Southern India. The volume contains a large number of essays on the Library Movement not only in English, but also in Tamil, Telugu, Canarese and Malayalam.

Sir Rabindranath Tagore points out the need for intelligent and cultured librarians who will be able to offer real help to those who come to libraries in search of knowledge and who will keep themselves in active touch with the literature which is being published in each subject. A library is 'big' only when it is able to render this kind of service and not by the mere possession of a large number of books. Sir P. S. Sivasawmi Iyer makes a number of suggestions for the consideration of those engaged in this work. He would have them engaged in the preparation of periodical lists of books in various subjects for the benefit of the average reader. Writing on *Among My Books*, Principal Seshadri pleads for the supplementing of public libraries by private collections of books. Householders must be taught to be as proud of the books in their houses as of their carpets and furniture, because there is a spiritual joy in the actual ownership of books which cannot be got from the mere borrowing of books from a public library. The book is priced remarkably low at two rupees. We would commend it not merely to those directly concerned with the library movement, but to the public in general.

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OPINIONS**The Madras Mail, Friday, October 31, 1924:**

Books which deal with the problems of educational psychology from the Indian point of view are too few and we, therefore, welcome most cordially one which makes such a study and makes it well. Miss Gordon's contribution to this field is one which ought to be read carefully and digested thoroughly by all those who have to do with the education of children, whether teachers or parents.

The value of Child Study is first twofold, from the point of view of theoretical psychology, and second of education. Education along with psychology has much to learn from the science of biology which suggests to both of these sciences the unit for study, viz., a reaction which is a response to a stimulus. The mental life ought to be viewed as is the physical from this point of view. Further, biological science is showing the usefulness both as to method and content of the observation of development. The study of child-nature is in accord with the genetic method which characterises all the biological sciences. Educationally we have more to do with children than with adults in our schools and so from the practical point of view also the more that we can learn about the nature of educands the better for our work. Miss Gordon's book is thus a real contribution to our literature, for it considers these questions with special reference to conditions in South India.

One of the most important of modern developments in this science is that made through the observation of individual differences. Although education is a social process and children are social in nature, yet we cannot deal with them too much in groups without doing great injustice to matters in which they are unlike. Studies made in Europe and America have their value for Indian teachers, but observations made in India, as Miss Gordon's have been, are of great value in enabling us to ascertain the similarities and differences with children of other countries, and the differences among groups and individuals here. Miss Gordon has not only given the result of her own observations but—what is even more important—she has shown teachers and others how they may observe for themselves.

The book surveys the more important problems connected with the study of child-nature. It deals with the stage of child development, with the processes of sense-perception, with play, hand-work, and fatigue, with exceptional children, both sub-normal and supra-normal, with measurements of intelligence, and with the application of the Kindergarten system to the Indian system. It is one of the books which the Academic Council on the recommendation of the Board of Studies in Teaching has declared as suitable for candidates for the L. T. degree. We hope that it may have a wide circulation as its influence is sure to be for good.

Education (Allahabad), March 1925.

The distinguished author of the book under review is one of the few enthusiasts in India who have taken to a systematic study of child-nature. The book embodies the results of close study by the author, not merely of the existing literature on the subject, but of the actual, mental and physical growths of children, as witnessed by her in several schools in Britain and India where she has had the opportunity to work. Within a brief space of 200 pages, the author has contrived, in her plain, matter of fact, and at the same time, engaging style, to elucidate the various topics connected with child life such as the sense perception, play, the service of Hand in Mental Development, fatigue, exceptional children, measurement of intelligence and the Kindergarten system; touching the various theories on these topics and supplementing them by her own views based on personal study and investigation. We would especially commend to our readers the beautiful and inspiring chapter on the Kindergarten system in which without going into technical detail, the author has surveyed the basic principles of the system and pleaded in accordance with these principles for the Indianisation of Indian education. We are sure that this

little book will prove an excellent handbook for teachers as well as parents and others interested in the subject and kindle in them a deeper interest therein. It has been already recommended by the Academic Council of the Madras University as a suitable text-book for the students appearing for the L. T. Examination and we hope that other Universities will soon follow suit. We congratulate both the author and the publishers on this valuable publication and recommend every teacher to secure a copy thereof.

The Madras Christian College Magazine, January 1925.

The study of child-nature is exceedingly important for both of the sciences of Psychology and Education. Its importance for Psychology is from the genetic point of view. In the child one is able to observe in simpler forms many of the processes at work which in adult experience become so complex as to make them difficult of analysis. Its importance for Education is too obvious to need extended notice, and yet there are some who are so short-sighted as to neglect it. Here in South India there are a great number of schools in charge of teachers who do not know the elementary facts about child-nature. But with the progress of education the time will surely come when it will be considered as dangerous to employ a teacher who is ignorant of child-nature as it is to employ a man for a physician who knows nothing of anatomy and physiology. Such a book as that which Miss Gordon has written will serve a useful purpose in hastening that day by putting teachers in possession of a primer which contains the fundamentals of the subject in a readable style. It is the type of book which we would like to see translated into our South Indian vernaculars, because it not only includes the principles of the science, but states them with special reference to the needs of Indian teachers.

A personality is the outcome of forces which are both hereditary and environmental so that child study must take account of both sets of factors. Much more is to be gained by teachers through the study of children for themselves than the mere perusal of books on the subject, however authoritative they may be. The trouble with so many students of other things as well as of child-nature is the evident desire to be spoon-fed. They desire to get their information at second-hand rather than take the trouble to study for themselves. In many instances teachers have not the technique necessary to observe intelligently. Very valuable, then, is Miss Gordon's chapter on 'How to Study a Child,' particularly for those who are beginners in child study, and it is a matter of vital concern as much for the parent as for the teacher.

Certain subjects have been especially studied recently by educationists, and Miss Gordon gives useful accounts of the results of these studies. One chapter is devoted to the place of play in child life and in the educative process. It is a wholesome corrective for the old fashioned idea that play is a superfluity. The author brings out some of the most useful services which are rendered by play, for play has direct educative value, assisting in the training of the judging and other mental processes, as well as in the spirit of fair-play and other moral qualities. The play-ground affords a splendid type of voluntary democratic organisation. Another chapter is devoted to "The Services of the Hand in Mental Development." Sometimes the school in emphasising the development of the mental processes has tended to neglect the fact that intelligence is sometimes motor, and that these two factors, the mental and motor, are closely related to one another. The questions of 'Exceptional Children' and 'The Measurement of Intelligence' are closely related, since it is through the latter that we get our most accurate knowledge of the former. A final chapter deals with a question on which Miss Gordon is surely competent to speak 'The Kindergarten System and Its Application to Indian Children.' Altogether she has succeeded in writing a most useful little book, and we hope that it may have a good circulation among teachers and parents who cannot but profit by what she has written on the nature of children and how they should be educated.

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In fine, this book bids fair to become easily a popular rival to the many books on Geometry now in the market—almost all of which are either American or English publications. We have real pleasure in wishing for this book an honoured place among the text-books now in use.

The Ernakulam College Magazine:—The author must be congratulated on the publication of this book which is indeed a very welcome addition to the existing books on the subject. It is intended for the student of the High School classes, though we would like every College student to go through it to get acquainted with the broad principles and the historical background of the subject. The method of treatment adopted will be much liked by students who will find the study of the subject quite a pleasant one. The work of the teacher is considerably lightened by the inclusion of interesting details which he may find difficult to get access to otherwise. The logical arrangement of the main propositions, the emphasis on practical applications and correlation to problems of every-day life, the human appeal to the pupil by means of historical notes and sketches and the very numerous sets of graded examples, are a few of the many interesting features of the book. We await with great interest the remaining parts of this book, dealing with Areas, Circles and similar Figures, which, we feel confident, will be on the same high level of treatment, quite in fitting with the long experience of the author as a teacher of Mathematics. We would however suggest that all the parts may be bound in one volume and published at a reasonable price.

Rao Bahadur P. V. SESHU AIYAR, I.E.S. (Retired), formerly Professor of Applied Mathematics, Presidency College, Madras, writes under date 10-3-1929:—A New Geometry for High Schools by Mr. A. A. Krishnaswami Aiyangar, M.A., L.T., is a book prepared to meet the special needs of the Indian High Schools. It follows closely the Madras S.S.L.C. Syllabus in Geometry for Group C and gives many exercises, practical, theoretical and numerical. One distinguishing feature of the book, not found in other books, is the historical and critical note added to many of the propositions. This relieves the student from the monotony of abstract reasoning, makes an effective human appeal to him and adds a life to the methods of teaching. His critical notes on 'superposition', 'parallel postulate', principle of duality, etc., are simply splendid and are likely to induce the advanced student to read more of rational and modern geometry. The book on the whole is well-conceived and written on most up-to-date lines and deserves to be used as a text-book in our High Schools in preference to other books in the field.

Mr. S. BALAKRISHNA AIYAR, B.A., L.T., Lecturer in Mathematics Teachers' College, Saidapet, writes under date 12-3-1929:—Dr. Vaidyanathaswami, M.A., F.R.S.E., of the University of Madras, has written the Foreword to Mr. A. A. Krishnaswami Aiyangar's book, "A New Geometry for High Schools." This ought to be a sufficient recommendation for the book being largely resorted to by teachers and students of the subject. The treatment followed appears to me to be on novel lines, following a kind of compromise between the Euclidean sequence and the re-adjustment found in the more modern text-books. The abundance of notes, historical, philosophical and critical, should be attractive to the teacher and the interesting variety of exercises useful to the learner. I am awaiting with interest the appearance of the other three books.

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