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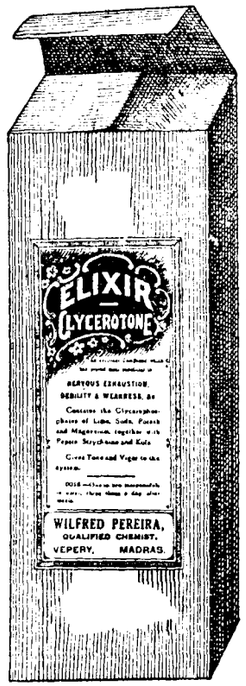

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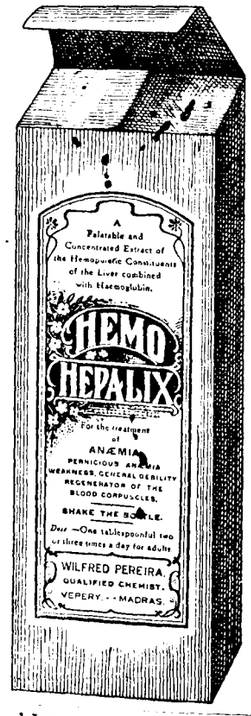

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were devised for effecting thoracic fixation by improvising large splints, or by the use of adhesive plasters strapped on the affected side of the chest. These were found effective to some extent, especially in lessening the pleural pains, but were of comparatively little use in curing the underlying pulmonary condition.

The first historic reference to collapse therapy dates as far back as 2,000 years ago, when the Greek physician Hippocrates conceived the idea of relieving pleural pain by inflation of air into the pleural cavity. The idea of Hippocrates in pumping air into the chest was to try and lift the heavy 'humor' which caused the pleuritic pain. The first rational attempt at inducing pneumothorax with the idea of collapsing the lung was made by James Carson at Liverpool in 1833 but unfortunately both the patients on whom the operation was attempted by open incision into the chest were advanced cases with pleural adhesions and the operation failed in both. Forlanini in Italy (1894) and Murphy at Chicago (1898) independently and successfully employed pneumothorax collapse in the treatment of pulmonary tuberculosis and this method with modifications and improvements is now adopted all over the world with excellent results.

Artificial Pneumothorax.

The principle of artificial pneumothorax treatment is based on the enforced rest which the diseased lung is made to obtain by the introduction of a gas into the pleural cavity whereby the inherent elasticity of the lung substance enables the organ to collapse and go into a condition of complete and permanent rest during the respiratory movements of the chest wall. The air-introduced into the pleural cavity, in other words, counterbalances by degrees the atmospheric pressure that tends to expand the lung during inspiration to make it fill up the distending thoracic cavity, with the result that the elastic recoil of the lung makes it shrink within the chest under the pleural air cushion as a splint. This shrinking can take place in 3 stages, *viz.*, (1) partial collapse with partial inspiratory expansion of the lung, a condition in which the intra-pleural pressure has not yet counterbalanced the intra-pulmonary atmospheric pressure—"expansile pneumothorax;" (2) complete collapse and rest of the lung with no expansion during inspiration, a condition in which the intra-pleural pressure has just counterbalanced the intra-pulmonary pressure—"static pneumothorax;"—and (3) a compressed condition of the lung in which the organ is crushed against

the mediastinum even displacing it towards the opposite side, a condition in which the intra-pleural pressure is greater than the intra-pulmonary—"compression pneumothorax." This last condition is the usual result of spontaneous pneumothorax due to rupture, the intra-pulmonary air being forced into the pleura by the pumping effect of cough through the valvular rent in the lung. In such a condition the mediastinum and heart are apt to be considerably displaced causing cardiac distress.

The ideal of pneumothorax therapy is to induce static pneumothorax and keep this up for a sufficient length of time to enable the diseased lung to undergo fibrosis and repair in its state of complete immobilization.

The technique of artificial pneumothorax induction is comparatively simple though the initial inflation requires a certain amount of skill and care. The point chosen for the puncture is one of the intercostal spaces between the 4th and the 6th in the axillary line, though some people prefer the scapular line. This area is least likely to have pleural adhesions. Forlanini judged the presence or absence of pleural adhesion by the respiratory excursion in the posterior axillary and scapular lines. At least one inch of excursion was considered essential before attempting pneumothorax. We have been for years employing the light intercostal percussion as a fairly reliable method of judging the presence or absence of pleural thickening and adhesion, the puncture being made in the inter-space where there is no impairment on light percussion.

Professor Brauer of Hamburg makes an initial puncture with a tenotome into the skin and through the intercostal space exposing the parietal pleura with the idea of avoiding blood vessels during the puncture of the pleura and preventing air embolism. Most workers have found this procedure quite unnecessary. In fact there is the risk of bleeding and sepsis in the open method of Brauer. With the interposition of the manometer which ensures the position of the point of the puncturing canula in the pleural cavity it is quite unnecessary to employ the open method.

Local anaesthesia with Novocaine (2 %) and adrenalin (½ %) is used both for the initial operation and for the refills, a dose of ¼ gr. morphia and 1/100 gr. atropine being also given hypodermically for the initial puncture to prevent pleural shock. It is advisable to give an enema and evacuate the bowels completely before the inflations as this

prevents respiratory distress and allows the inflow of air into the pleura to take place with ease. The intercostal space is broadened during the operation by keeping a hard pillow below the chest opposite the point selected for puncture. This procedure is especially of value in the later stages of the disease when tiling of the ribs is apt to obliterate the intercostal spaces preventing the insertion of the canula or needle used for the pneumothorax induction or refills. It is advisable at the initial induction to puncture the thorax as far away from the lesion as possible to avoid possible pleural adhesions.

A very simple apparatus for artificial pneumothorax induction is Lillingstone and Pearson's apparatus with which the air is introduced into the pleura by water displacement from a sterile bottle. About 250 c.c. of air is put in during the initial inflation and the quantity is increased by 50 c.c. at each succeeding refill till the maximum of 600 to 800 c.c. or more is ultimately introduced, this last quantity being repeated during the later refills. The intervals between the refills is increased from 2 days to one month, by gradually increasing the interval with the increase in the amount of air. Normally from 25 to 50 c.c. of air is absorbed by the pleural surface per day and it is to make up this loss by absorption that the refills have to be carried on for months until the lung has healed as much as possible.

Pneumothorax treatment produces its effect (1) by giving complete rest to the lung which normally has to work 25 to 30 thousand times a day. This rest promotes healing, fibrosis and repair, (2) by mechanically squeezing out toxic and septic material from the cavities and lung tissue into the bronchial tubes and through them out of the body by expectoration, thereby cutting short the toxic absorption causing the constitutional symptoms and general disturbance, (3) by collapsing and contracting and thereby limiting the focal areas and the surface of toxin production, (4) by contracting the pulmonary vessels and lymphatics, thereby limiting metastasis as well as toxic absorption, (5) by dilating the nutritive blood vessels of the lungs thereby promoting healing on Bier's principle, (6) by the presence of air in the pleura which is supposed to promote fibrosis in the lung and (7) by the ultimate adhesive pleurisy resulting at the termination of the collapse treatment which helps in immobilization of the lung and preventing relapses in future life.

The various accidents which may possibly occur during the treatment, *viz.*, pleural shock, air embolism, pulmonary puncture with deep and interstitial or superficial and subcutaneous emphysema, etc., can be minimized or even prevented with care and experience. The occurrence of pleural effusion, which is more common in colder climates is not a great disadvantage. It does not usually interfere with recovery, but causes some inconvenience during the treatment as it prevents the periodic inflations being carried on.

The treatment is indicated in (1) acute unilateral disease, (2) when less than ½ of the collateral and healthier lung is involved, (3) in abscess, bronchiectasis, gangrene, etc., and (4) in profuse haemoptysis from one lung. It is contra-indicated (1) in extensive bilateral disease, (2) in fibroid phthisis where the lung has no contractile power and adhesions are usually present, (3) in asthma, (4) in old age (5) when there are vsceral complications, (6) in haemoptysis from the collateral lung, (7) when activity in the collateral lung increases and (8) when the general health is low or there is diabetes with a low general condition.

Bilateral and simultaneous artificial pneumothorax has been tried in bilateral disease but with doubtful results. For obvious reasons complete bilateral collapse is inapplicable. It is quite possible however to apply the collapse therapy to one lung first and when that lung is fibrosing to allow it to resume function and collapse the other lung.

About 5 to 10 per cent of all cases of phthisis are supposed to be fit for artificial pneumothorax treatment. Deducting cases which are found at the actual operation to have extensive adhesions, the number of suitable cases is perhaps much less than 5 per cent.

The effect of pneumothorax collapse on the disease is often of a most remarkable character. The temperature goes down quickly, often coming down to normal in a few days or weeks, the cough and temperature lessen rapidly, the constitutional symptoms are relieved, the weight increases; bacilli lessen in the suptum and even disappear, and the general condition improves remarkably. The displacement of the mediastinum resulting from the pleural inflations may cause an initial nutritional disturbance leading to a slight decrease of the weight, which later on increases steadily. In fact the result of the treatment is often so dramatic that the patient obtains in a few weeks the benefit for which he would have to wait for months by ordinary treatment.

The great drawback of the treatment is the length of time, often 2 to 5 years for which the patient ought to be under the immediate treatment of the doctor especially in this country where few medical men have so far adopted the treatment. A most annoying complication met with is the obliteration of the pleural cavity which often sets in rapidly due to an adhesive pleurisy set up by the inflations. Why it occurs in some cases and not in others is difficult to understand, but pleural obliteration is responsible for the stoppage of the treatment in quite a good number of cases otherwise progressing satisfactorily. If this obliteration can be prevented by some mechanical measures as by oiling the pleural surface with paraffin or olive oil, the treatment could be made to give better results than are obtained at present.

In analysing the results of artificial pneumothorax therapy one has to classify cases into those who had a good course of treatment and those who for various reasons were not able to go through a good course. For purposes of the analysis, I have taken cases that had a minimum of 6 months of treatment before discharge and those that had less than 6 months of the collapse treatment. It is not at all an easy matter to collect the statistics of patients some time after their discharge from hospital. Most of the patients that seek admission are of the illiterate type who cannot even give their correct addresses to enable us to trace their whereabouts after discharge, especially when one tries to know the ultimate fate of these patients some years after the termination of the treatment. Thus of 584 cases that were treated with artificial pneumothorax in the Madras Tuberculosis Hospital since 1925, it was possible to obtain the after histories of 258 only, the rest of the patients not answering enquiries about their welfare. The statistical analysis thus loses much of its scientific value.

The immediate results of pneumothorax collapse therapy are brilliant. Of 47 cases treated in 1925, 86 per cent obtained very great benefit from the treatment and all benefitted to some extent amongst those in whom the collapse was good. When the collapse was partial 27 per cent showed much benefit and 58 per cent benefitted to some extent. On the whole 70 per cent of all the cases benefitted from the artificial pneumothorax treatment. With the lapse of years many of these cases have relapsed or died. Of 104 cases that had a good course of artificial pneumothorax, 103 were alive at the end of the first year, 97 at the end of 2 years, 90 after 3 years, 84 after 4 years, 78 after 5 years and 75 only after 6 years. These figures relate to those patients only whose whereabouts and condition could be traced. It is thus likely that about 50 per cent only of the patients were alive after 6 years. Similarly of 111 cases that had a course of pneumothorax of less than six months' duration 64 only were alive after 6 years, which, after correction for unknown cases, probably means that 30 per cent of patients were alive after 6 years. Roughly speaking the ultimate results of artificial pneumothorax treatment appear to be only half as good after 5 years as they appeared to be at the termination of the treatment. But they were definitely better than the results obtained amongst the controls, *i.e.*, cases wherein pneumothorax treatment could not be carried out due to adhesions. Amongst these 25 per cent or less were alive after 5 years. Pneumothorax treatment therefore gives results definitely superior to those of ordinary sanatorium treatment.

Phrenic Avulsion.

Phrenic Avulsion which was first suggested by Stuertz in 1911 has later on been developed and practised by Walther, Sauerbruch and others. It is applied to cases where, due to pleural adhesions the lung cannot be collapsed by artificial pneumothorax or can be collapsed to a very partial extent only. The original 'phrenicotomy' operation consisted in exposing the nerve in the neck and cutting out an inch or so of it. It was found that the results of this operation were unsatisfactory as the phrenic nerve has several anastomotic branches from the cervical and even dorsal spinal nerves and the movements of the diaphragm continued after the phrenicotomy. Sauerbruch's operation consists of a complete extirpation of the nerve by twisting it off from all the anastomotic branches. The nerve trunk thus removed varies from 6 to 16 inches in length and the paralysis of the diaphragm resulting from the extirpation is complete, so that the dome of it could be seen on the fluroscopic screen to be fixed about 1 to 2 intercostal spaces higher than before the operation or a height of 1 to 3 inches. This causes a considerable amount of collapse especially in the lower zone of the lung. The operation is therefore of great value in basal inflammations with adhesions, bronchiectasis, basal cavitations and fibrosis of tuberculous involvement and in cases of abscess or gangrene at the base. Contrary to what was originally considered, phrenic avulsion is now known to be of benefit in apical disease also. By a system of pulmonary measurements between fixed points in the lung substance as taken in the skiagrams,

it has been found that as a result of phrenic exairesis in 57 cases, an average collapse of the lower zone of 19 per cent takes place, such collapse varying from 4 per cent to 54 per cent in different cases. In the upper zone on the side of the exairesis there is similary a collapse of 1 to 38 per cent, the average being 7 per cent. The collateral lung shows a compensatory action with an average of 5 per cent stretching in the upper zone and 2 per cent in the lower zone.

A very interesting observation made in the series of 57 cases wherein the measurements were carefully taken, was that in about 50 per cent of the cases there was a sympathetic inhibition of the diaphragmatic movement on the side opposite to the phrenic avulsion, giving a collapse in the lower zone of that lung varying from 1 to 34 per cent. This sympathetic paralysis of the diaphragm needs investigation.

Of the 100 cases treated by phrenic avulsion most were very advanced, a few being bilateral. The results of 57 cases only have been analysed the others having been operated on too recently to judge results. Of the 57 cases, 42 per cent were much improved and 92 per cent benefitted when the lesion was in the lower zone only of the operated side; 26 per cent much improved and 63 per cent benefitted when the lesion was in the upper zone only; and 44 present much improved and 94 per cent benefitted when the lesion affected the whole lung.

The special advantages of phrenic avulsion therapy are (1) its easy application—the operation being done under local anaesthesia and producing no shock even in weak subjects, (2) the short period of time necessary to keep the patient under personal treatment unlike artificial pneumothorax treatment which has to be carried on for months or years, (3) its applicability when pneumothorax fails or is inapplicable, (4) its not being contra-indicated when the other lung is actively involved, (5) its applicibility to both sides of the chest and (6) the fair permanency of its effect.

Extra-Pleural Thoracoplasty.

Extra-pleural Thoracoplasty first suggested by Quincke in 1888 was developed later by Brauer, Friedrich and Sauerbruch. The operation is done under local anaesthesia either in one stage or two stages, the ribs being removed in two lots of 5 each at the two sittings. The success

of the operation depends on the thoroughness with which the ribs are extirpated. They ought to be disarticulated at the costo-spinal articulations behind and cut at the cartilaginous junction in front, the periosteum being first resected with a special rougine. The collapse produced by thoracoplasty is much greater than that resulting from phrenic exairesis, though less than that of artificial pneumothorax. Here again the advantages of the operation are its completion in one or two sittings and its applicability when pneumothorax fails. The great disadvantage is the severity of the operation, ordinary Indian patients not standing the shock of the operation well. The deformity resulting from the operation is negligible. The results of a successful thoracoplasty are usually good and fairly permanent especially when the collateral lung is healthy.

Extra-Pleural Pneumolysis.

Extra-pleural Pneumolysis is employed in apical disease with adhesions especially when there are cavities which refuse to fill up and heal. After removal of the ribs, a plug of fat or Bismuth paraffin paste is placed under the thoracic wall to effect collapse of the cavity by pressure. The results are said to be good in expert surgical hands but there is the liability to sepsis and secondary infection to be considered, as also tbe possibility of the plug not remaining in its proper place but getting dislocated.

Oleothorax.

Oleothorax has recently been advocated and employed as an alternative to pneumothorax. The great disadvantage of the latter is the long period of time the treatment has to be continued and the frequency with which the refills have to be given. Oleothorax is intended to partially remedy these defects, as paraffin and olive oil, the substances used for oleothorax are not readily absorbed by the pleural surface and the refills need not be given so frequently. 2 to 10 per cent of gominol is mixed with the oil either for its stimulant or antiseptic effect, the former effect being desired in ordinary severe pleurisies and the latter in the empyemata of tuberculous or septic origin. One great advantage of oleothorax is supposed to be its effect in fixing a too labile mediastinum and stiffening a too soft and pliable pleura. There is a liability to reactions in the employment of gomenolized oil but these reactions are very temporary. The paraffin or olive oil used must

be thoroughly sterilized, a temperature of 220°F for 30 minutes being required to sterilize paraffin and 300°F to sterilize olive oil. The special features of oleothorax therapy are (1) the fact that long intervals can elapse between the refills and the treatment can therefore be applied to non-resident patients who have to come from long distances, (2) the liability to pleural obliteration ought to be much less in oleothorax than in pneumothorax, the pleural surfaces being permanently under the lubricating influence of the oil.

It is yet too early to judge the ultimate results of oleothorax therapy, but the immediate results obtained both in ordinary and in tuberculous and septic pleurisies justify its employment in all cases of pleurisy with effusion, where, as in artificial pneumothorax, pleural obliteration has to be guarded against or as in the case of the toxic or septic exudates an antiseptic or stimulant action on the pleura is desired.

Some Observations on Malignant Disease and its Treatment in South India.*

(By N. S. Narasimham, F.R.C.S.,

General Hospital, Madras.

An enquiry was set on foot by the British Medical Association in 1929 in the United Kingdom and notes of 2,250 cases only have been sent in for review up to end of September 1930. An appeal has been sent in by the organisers of that enquiry for more cases. A consideration of 475 cases from 1928 up-to-date end of September 1931 seen in the First Surgeon's wards of the General Hospital, Madras, may be of some value. Lt.-Col. E. W. C. Bradfield took a great personal interest in this enquiry and published in the Indian Medical Gazette and in the Bulletin of the South Indian Medical Union [2] his observations on Cancer. I am indebted to him and Col. R. G. G. Croly for their kindness and encouragement in connection with this work.

Patients with diseases of the female generative organs go to Special Hospitals for Women and Children and hence very few cases of cancer of the cervix and labia are mentioned in this series. It is possible that some cases of cancer of the rectum and breast also are admitted into those hospitals.

The cases under the other surgeons of this hospital are not included and this is mentioned here to show that this figure does not indicate the extent of the disease seen in this province, including native states. There is no means of computing the incidence of the disease separately in towns, or districts; Patients are drawn from all over the province and naturally they might have been seen in more than one hospital of the province. The figures supplied by the Health Officer of the Corporation of Madras under the heading of deaths from malignant disease are low and are as follows :—

* A paper read before the Madras Medical Association in November, 1931.

Statement showing the mortality from cancer in the City of Madras for 5 years from 1924-28.

Years.	Cancer of the bucal cavity.	Cancer of Pharynx, Oesophagus stomach, Liver and annexa.	Cancer of Peritoneum. Intestine and Rectum.	Cancer of female genital organs.	Cancer of breast.	Cancer of other unspecified organs.
1924	Not available					71
1925			Do.			38
1926			Do.			33
1927	13	9	1	12	6	36
1928	16	17	2	5	6	33

It may be notified that under various headings of enquiry and search for some fact and information the whole total of 475 cases have not been reviewed, because the questions were being enquired into for a long time from 1929 to 1931 and the information elicited then and there for the particular set of series of cases has been given.

The annual admissions for the whole hospital for 1929 is 411 : Sarcoma 41 ; Rodent ulcer 2 ; Carcinoma 367.

I		I		
Melanotic	3	Abdomen	9	
Bones	10	Glands	6	
Others	28	Breast	42	
	—	Larynx	8	
	41	Stomach	16	
	—	Cheek and Jaw	143	187 (over 50%.)
		Tongue	44	
		Tonsils	4	
		Oesophagus	4	
		Rectum	25	
		Liver	4	
		Penis	27	
		Cervix	8	
		Other situations	24	
		Cutaneous	3	

The percentage of distribution in U.S.A. (3) (1913 is

Buccal cavity	3·94%.
Stomach and Liver	39·59%.
Peritoneum, Intestines, and Rectum	13·27%.
Female generative organs	15·43%.
Female breast	9·2%.
Skin	3·45%.
Other organs or parts	15·42%.

In Ceylon 6·8 deaths per 100,000 of the population is from cancer. It may be an under-estimate : Cancer of the oral cavity is extremely common ; but the Burghers and Europeans suffer more than Sinhalese 5 and 4 times. Breast cancer is 10 times more common in England than in Japan whereas cancer of the stomach is more common in Japan than in England and Wales.

CASES OF 1928 AND 1929 (UP TO OCTOBER).

Classified :—

	Cancer		Sarcoma	
	1928	1929 9 months	1928	1929 9 months
Fibula ...	...	...	1	...
Palate ...	3	...	...	...
Cheek ...	24	20	...	..
Tongue ...	10	13	...	...
Jaw ...	3	3	...	...
Floor of mouth ...	3	5	...	...
Larynx ...	1	1	...	...
Rectum ...	3	3	...	...
Lip ...	1	...	...	...
Cervix ...	2	1	...	...
Breast ...	2	9	...	...
Parotid ...	1	...	...	...
Neck ...	2	...	...	...
Bone ...	...	...	1	...
Lymph Gland ...	...	...	2	...
Penis ...	...	1	...	...
Thigh ...	...	1	...	...
Sarcoma of Uterus ...	...	...	...	1
Chest ...	...	...	...	1
Face ...	...	1	...	...
Sarcoma cheek ...	...	...	...	1
Tonsil ...	...	2	...	...
Anus ...	...	1	...	...
Osteosarcoma of Jaw ...	...	...	...	1
Melanotic ...	...	...	...	1
Rodent ulcer nose ...	...	2	...	...
	55	64	4	5
	119		9	

All these cases received a good dose of radium for a short period generally 50 mgs. for 24 or 48 hours. All the cases are dead except one case of Parotid tumour. They will be referred to later on under treatment. The following is the list of cases from October 1929 to October 1931.

399 cases of malignant disease were admitted into the wards during the period October 1929 to 1931 of which particulars are available in 374 cases.

Sarcoma. 44
Carcinoma. 330
} 374 cases.

Religion.		*Sarcoma.*	*Carcinoma.*
Hindus	...	35	251
Mohammadans	...	5	26
Christians	...	4	53

The percentage of population in this province according to the recent census is Hindus 81%; Mohammadans 7·5%; and Christians 3·5%.

Age Groups.	*Sarcoma.*	*Carcinoma.*
5 and 10	8	...
10 „ 20	6	2
20 „ 30	5	9
30 „ 40	12	68
40 „ 50	6	103
50 „ 60	4	75
60 „ above	3	62
Age not noted		11
Native place.		
Malayalam speaking	3	71
Tamils	24	142
Telugu	9	58
Hiudusthani	3	21
Canarese	2	7
Europeans and Anglo-Indians	3	31

Regions.	*Carcinoma.*	
Breast	... 26	
Cheek	... 117	(one both cheeks).
Palate and jaw	... 27	
Tongue	... 36	
Do. and floor of mouth	... 5	
Brain	... 3	
Penis	... 27	(Penis and cheek 1).
Upper lip	... 3	
Lower lip	... 8	
Tonsils	... 1	
Stomach	... 12	
Abdomen	... 2	
Liver	... 5	
Pancreas	... 2	
Glands	... 4	
Parotid	... 5	
Larynx	... 8	
Nose	... 5	
Labium	... 1	
Anus	... 2	
Rectum	... 13	
Rodent ulcer	... 5	
Face	... 2	
Multiple Rodent ulcers	... 1	
Oesophagus	... 2	
Scalp	... 5	
Prostate	... 1	
Finger	... 1	
Submaxillary land	... 1	
Cervix	... 3	(all cases go to special Women's Hospital).
Female urethra	... 1	
Groin	... 2	
Odontome	... 2	
Foot	... 1	
Multiple epithelioma	... 1	

Spinal cord	...	1
Thyroid	...	1
Groin	...	1
Testis	...	1
Vagina	...	1
		345

Sarcoma.

Maxilla	...	1
Abdominal wall	...	2
Abdomen	...	1
Retro peritoneal	...	1
Rib	...	1
Face	...	1
Neck	...	1
Vertebra	...	1
Testis	...	1
Lymphosarcoma	...	3
Parotid	...	1
Skin	...	5
Bones	...	6
Palate and jaw	...	6
Nose	...	2
Breast	...	1
Thigh and leg	...	3
Groin	...	1
Multiple sarcoma	...	1
Shoulder	...	1
		40

Sex distribution.

Male. 239 *Carcinoma.*

Female. 91 ,,

There is a higher incidence among men than in other countries.

Sex distribution. *Carcinoma.*

	Male.	Female.
Tongue and floor of mouth.	32	9
Cheek ...	87	30

Sex distribution. *Carcinoma.*

		Male.	Female.
Palate	...	16	4
Foot	...	0	1
Breast	...	1	26
Anus	...	1	1
Rectum	...	13	...
Neck	...	1	...
Brain	...	2	1
Testis and abdomen	...	2	...
Abdomen	...	2	...
Pancreas	...	2	...
Testis	...	1	...
Upper jaw	...	2	...
Lower jaw	...	5	...
Parotid	...	8	2
Humerus	...	...	1
Penis and cheek	...	1	...
Penis	...	24	...
Urethra	...	1	1
Lip	...	10	0
Back	...	2	1
Finger	...	...	1
Liver	...	4	...
Prostate	...	1	...
Nose and antrum	...	3	...
Stomack	...	10	2
Groin	...	2	1
Scalp	...	3	...
Cervix	...	...	3
Tonsil	...	1	...
Labia	...	...	1
Spinal Cord	...	...	1
Rodent ulcer	...	1	3
Larynx	...	3	1
Thyroid	...	1	...
Thigh & leg	...	2	...
Odontoma	...	2	...
Vagina	...	...	1
		239	91

There is a great preponderance of oral cancer—187 out of 367 cases admitted in the hospital in 1929; 84 out of 120 cases admitted into the First Surgeon's wards in 1921 and 1929; 197 out of 345 cases in this series.

There is a preponderance of males (152 against 43 females) in this series of oral cancer. This is of great importance in view of the fact that the chewing habit is universal both in males and females.

Etiology:—The disease is found to be uniformly present in all the parts of the province. It is not correct to say that the cancer of the buccal region is prevalent more in the Malayalam speaking area than in other parts of the province.

Of 234 cases of malignant disease of the various organs admitted into the First Surgeon's wards from September 1929 up to 31st December 1930 there were 73 cases of cancer of the cheek and 36 of tongue, floor of mouth and palate *i. e.*, 109 of oral cavity. These patients were from the following areas:—

	Cheek.	Tongue, floor or mouth, Palate nad tonsil.
Tamils ...	29	12
Madras ...	5	1
Telugus ...	8	9
Malayalam speaking ...	28	6
Canarese ...	2	3
Europeans & Anglo-Indians ...	1	5
	73	36
	109	

In 1928 Sabhesan[4] analysed 57 cases of cancer of the cheek in this hospital and noted that out of 57 cases 43 were on the left side and the usual site of onset appeared to be in the crypt formed by the reflection of the mucous membrane from the alveolar margin of the lower jaw on to the cheek. Even here there appears to be a greater frequency of onset near the first molar tooth.

I analysed my group of cases but strangely I find that the incidence is *exactly the same on both sides of the cheek* and in the case of breast

left side 16 and right side 7. Palate left 10 and right 1; toague left 11, right 8, whole tongue 3.

The onset varies anywhere from the angle of the mouth, on the anterior third of the mucous membrane, middle third and a slightly greater proportion in the region of the first molar teeth.

An analysis of 96 cases of cancer of cheek shows as follows:—

Three cases were in Edentulous people (they had no teeth for the past few years) ...	2
Cheek and adjacent alveolar margin as a hard lump ...	1
Anterior third of the cheek ...	2
Commencing at the angle of the mouth and spreading back ...	17
Growth of upper lips spreading into the cheek ...	7
Angle between jaw and cheek ...	3
A tumour inside the cheek (mucous membrane not affected) ...	2
Apparently beginning in the lower jaw ...	9
Opposite the molar and premolar region ...	24
Middle of the cheek ...	7
Beginning as a nodule in the cheek ...	7
Beginning as an ulcer in the cheek ...	12
Whole cheek ...	3
Ulcer floor of mouth ...	1

Thus it may begin anywhere having no relation to chewing and keeping quid; the mucous membrane may not be affected at all; it may start as a nodule or as an ulcer.

The chewing habit of the South Indian and the Ceylonese (this applies to other parts of India, Bengal, U. P., C. P. and Bombay, as well I am not aware of conditions in Punjab and N.W.F.) consists in chewing betel leaves with chunam (lime) and arecanut. There are various varieties of chunam coloured and uncoloured, prepared from shell or other lime. The arecanut used also varies; it can be used fresh or dry or cut into slices and seasoned. The leaves themselves vary in size and in pungence. People do not chew ordinarily before they are 15 years of age. Generally people chew after food, *i.e.*, twice or thrice a day. There are many who do not chew. A few people keep a quid in their mouth during work as well as when asleep. This sort of man generally

chews many times daily. The workman chews when he is tired during work, *i.e.*, the interval from work just as one smokes.

There is no available study of the mucous membrane of some of these people who do not show any abnormalities. The earliest cases available for study are cases No. 301, 423, 373.

Except in 2 cases the mucous membrane was affected in the beginning. There were 11 cases of Leukoplakic patches, the Wassermann being negative in all these cases; it may start as a leukoplakia, (11 cases) or as a wart or nodule (7 cases) or as an ulcer (12 cases) or as a fissure (3 cases) it extends from the angle of mouth backwards (17 cases) or from lips (7 cases) backwards and in all directions to the alveolous and jaw. In other instances it is not evident.

There was only one Anglo-Indian male patient with cancer of the cheek who was not accustomed to chewing at any time in his life.

As in this Province cheek cancer is important I am giving below the details of a few cases which looked important in throwing some light on the condition.

Thinking that the aberrations of eruptions of molar teeth are common, all the cases were X-Rayed and in no case was an unerupted tooth in the lower jaw noticed.

Case No. 400.—The mucous membrane of the cheek is not affected by the disease; there is an ulcer on the right side of the palate but there is a tumour inside the cheek; skin is adherent.

409.—First noticed a small nodule.

415.—Started as a small growth.

308.—Started as a growth and extended to gums and jaw.

423.—A small Leukoplakic patch ulcerated in the inner aspect of the cheek, flush with the surface.

399.—3 years ago he bit the inside of his cheek and it left a thickening there. There is a small ulcer on this site.

358.—A hard extensive growth of the right cheek tumour protruding through the chin.

368.—Started as a small ulcer on the inner side of the right cheek; it gradually extended involving the whole of the cheek and both the upper and lower lips (halves).

335.—Age 53. Male. Chronic glossitis for 12 years; drinks, chews occasionally; does not keep the quid; tobacco not used. Smokes now and then; a red indurated area on the left cheek; does not bleed—referred by a doctor. Wassermann Negative.

279.—Age 40. Male. 5 years ago patient noticed a small lump on the inner aspect of the left cheek near the wisdom tooth; now it extends over the whole of the cheek involving the gum.

333.—Age 40. Male. Chewing tobacco since 16 years of age; growth of one year's duration, extends to the whole of the right cheek.

301.—Age 39 Male. A leukoplakic patch of about one inch in length and one c.m. above the upper dental margin; two on the right side at about the level of the last molars. Chews occasionally: Wassermann negative.

Pathological Report.—" Hyperplasia of the surface epithelium ". Weight 98 lbs. Duration 5 months. The condition is stationary after radium exposure. He is being watched to study the condition.

424.—Muhammadan male, aged 65. Started as a small pimple and has now extended as a warty growth to the right half of the lower lip and to a small extent the upper lip; it is extending into the right cheek.

416.—Right angle of mouth extending to upper and lower lips.

354.—The whole of the lower lip and upper lip on the left side is eroded.

343.—The lower lip and the alveolar margin is affected.

324.—Female, aged 55. The whole of the lower lip and the right angle of the mouth is affected with involvement of bone.

412.—Ulcer right side of lower lip; occasional chewing and smoking habits; pipe not used.

373.—Started as an ulcer in the left cheek 5 months ago, spread to the angle of the mouth and alveolus; the epithelium is denuded in the above areas exposing an irregular raw surface. Wassermann negative; Age 32. Male.

283.—Age 45. Male: Excessive chewing and smoking habits. Started on the left angle of the upper lip as a small nodule and it now involves both upper lips and the left cheek as far as the wisdom teeth; the tongue is also involved.

154.—Anglo-Indian male, aged 71. Excavated ulcer on the inner side of left cheek of 6 months duration opposite both upper and lower molars, extending forward as far as the first premolar.

124.—58 Male. Hindu. Small leukoplakic patches on the inside of the left cheek.

120.—30 Male. Hindu. Leukoplakic patches inside cheek along side a large growth in the cheek.

112.—43. Male. Indian Christian. A few leukoplakic patches in the cheek along with growth in the cheek.

96.—Chewing with tabacco from his 19th year. Age 60. Male.

94.—Indian Christian. Male. 45. Growth in the angle between jaw and cheek. Leukoplakic patches on the inner side of same side of the cheek. Wassermann negative.

84.—Male. Hindu. 55. Epitheliomatous growth jaw and cheek at its lower part. No ulceration on the inner aspect of the cheek.

62.—Ulcer on the Vertical ridge behind the last molar tooth and the adjacent part of the inner surface of the cheek.

19.—Patient is Edentulous. Male aged 65. cheek and tongue both affected.

209.—30 years. Hindu. Male. Started as a fissure on the inner side of the cheek a little behind the angle of the mouth.

261.—55 years. male. Indian Christian. History of tobacco habit from childhood. Started as a small abrasion on the mucous membrane of the cheek (right against the 2nd molar tooth and extended thence to the whole of the mucosa.

262.—40. Male. Hindu. Tobacco habit from childhood. Started as a small ulcer on the mucous membrane of the right cheek opposite the molars and extended thence in all directions.

266.—40 years. Female, Mohammedan. Both cheeks are affected, duration 1 year. It started in the right cheek at the angle of the mouth; both the lips are involved on the right side.

250.—40 years. Male. Hindu. History of chewing tobacco from a young age; started as a small fissure at the junction of mucous membrane with the gum of lower jaw.

236.—50 years. Male. Hindu. Started as a small nodule in the lip at the right angle of mouth and then ulcerated extending on to the cheek.

232.—50 years. Male. Hindu. Started as a small nodule in the lower lip at the right angle of mouth and then ulcerated extending on to the cheek.

230.—52 years. Male. Indian Christian. The lower lip and the angle of mouth involved.

223.—50 years. Male. Hindu. Ryot, 8 months duration; epitheliomatous ulcer, 1 inch in diameter in the

region of the right external canthus fixed to bone; another ulcer inside right cheek extending just outside the angle of the mouth.

173.—51 years. Male. Indian Christian. Had a large fleshy growth on the inside of right cheek in the space between upper and lower molars; complete dental extraction was done and radium treatment was given. The patient was seen 9 weeks after; then the growth has become quite flat but leukoplakic patches were seen; seen 3 months after, the growth had disappeared, but a few leukoplakic patches were seen on the cheek and upper and lower lips. This was noticed on the opposite cheek in another case which had undergone several radium exposures for a growth in the palate.

46.—55. Female Hindu. Cancer cheek extending from angle of mouth to the last molar tooth; a large nodular leukoplakic patch near the angle of the mouth about ½ inch long and a few smaller patches distributed throughout the ulcer.

8.—37 years. Male. Indian Christian. A large superficial warty plaque on the inner aspect of the right cheek with the mucous membrane ulcerated.

31.—25 years. Male. Hindu. Spindle-celled Sarcoma cheek.

An enquiry into 49 cases regarding the chewing habit showed as follows:—

Chewing	...	9
Chewing with tobacco	...	28
Chewing and smoking	...	5
Chewing with tobacco and Smoking.	...	3
No chewing	...	2
Smoking only	...	2
		49

A good deal of work has been done on carcinogenic agents by the Medical Research Committee, London. In 1927 at the instance of

Col. Bradfield, Major C. Newcomb, Chemical Examiner, Madras, kindly analysed samples of lime and the report is appended[5].

The three samples of lime were examined with the following results:—

		Paste.	Received on 11-8-27. Powder.	Received on 22-8-27. Lump.
Insoluble in HCl per cent	...	0·3	9·5	2·0
Ferric Oxide and Alumina	,, ...	0·5	3·7	trace.
Lime CaO	...	35·0	41·2	65·4
Carbon dioxide	,, ...	2·7	24·0	18·6
Water	...	61·2	18·0	12·6
Magnesia and loss	...	0·3	4·0	1·4

THE ABOVE FIGURES WORK OUT TO THE FOLLOWING COMBINATIONS.

Insoluble in HCl per cent	...	0·3	9·5	2·0
Ferric Oxide and Aluminia	,, ...	0·5	3·7	trace.
Calcium Carbonate	,, ...	6·1	46·4	42·3
Calcium hydroxide	,, ...	41·7	20·0	51·8
Cal. Oxide	,, ...	...	...	2·5
Magnesium Carbonate	,, ...	...	7·6	...
Water	,, ...	51·1	13·2	...
Unaccounted for	,, ...	0·3	0·4	1·4

Relation of syphilis to malignant disease.—There is no relationship; only 12 out of 234 cases had a positive Wassermann reaction (weak, moderate and strong all included), of which 5 out of 109 cases were of oral cancer. In a series of 425 patients the serum reaction was positive in only 5·9 per cent but 8 per cent in cancer of tongue.

There was one case of advanced gout in a European male who had carcinoma of the oesophagus. There were 2½ cases of diabetes (presence of sugar in urine) in patients suffering from cancer cheek males (2), Penis (1), Rodent ulcer 1 (female). There was one male patient who had diabetes, tuberculosis of the lungs and larynx, and

cancer of the cheek. There was one albino with multiple squamous celled carcinomata of skin of face, chest and back. A case of cancer of the cheek had previously undergone operation for tuberculous glands both axillae and neck. An old man asserted that his cancer cheek and adenoma of thyroid were noticed simultaneously. From this it can be concluded that there is no definite relationship between malignant disease and other diseases. There was one case of multiple neuro-fibroma who developed a sarcoma in one of the fibromatous tumours.

Existence of pre-existing scar.—There were only two cases ; one an epithelioma of the skull affecting the skull bone arising from a scar on the scalp as a result of an old injury viz. avulsion 20 years previously.

The other was a sarcoma arising from a keloid of the chest wall after burns.

Examination of the theory of chronic irritation.—This is one of the most accepted theories as a primary predisposing factor.

Theory of chronic irritation is the oldest put forward on clinical observation by Virchow and others.

Numerous chemical irritants studied experimentally have been shown to possess a certain capacity to induce a typical cell proliferation but none of them approaches the tar products in this respect. The products of combustion of tobacco do not produce carcinoma in young animals.

Japanese work on experimental production of cancer.—60 to 80 per cent of mice so treated develop epithelioma ; average period of tar irritation is 6 months, *i.e.*, 1/6th of the period of life of the mouse, *viz.*, 3 years. If this is applied to man it gives a period of 10 years. There is thus a long period of induction ; so cancer is a disease of middle or old age.

In all cases the irritation is of a prolonged and chronic character. Cancer does not develop in a healthy tissue but in one whose resistance has already been weakened, usually as the result of chronic irritation.

The wide zoological distribution of malignant disease throughout the animal kingdom suggests the possibility of some parasitic factor. Against this is the formidable factor that it is not possible to transfer the disease from one species to another as can be done in a case of tuberculosis.

According to Luncere the essential preliminary for the production of cancer is a scar. It is probably true, except in the case of moles, that microscopic processes of sub-epithelial chronic inflammation which lead to the formation of scar tissue invariably preceed a carcinoma. That scar formation is not the cause of malignant growths is shown by the extreme rarity of malignant growths after clean surgical operations.

Arguments against the irritation theory.—In man at least, so very few of the subjects exposed actually develop cancerous growths and it has been held that the irritants merely prepare the soil for the intervention of some other cause. In the great majority of cases of cancer it is difficult to trace any definite sort of irritation.

Cancer of the tongue.—Lane Claypon found that the closest association found is with syphilis sometimes accompanied by some other cause of chronic irritation. There is also a close association with leukoplakia either with or without previous syphilis. She wrote that no data were available which would enable the frequency of supervention of cancer of the tongue in syphilitic subjects to be ascertained. The data in respect of smoking are unreliable but as far as they go do not suggest an association with cancer in this situation. There were not numerous instances where the sharp edge of a tooth was the exciting cause of cancer. The mean age was found to be 54 whilst the mean age of deaths was 61 and the disease was roughly 10 times as common in men as among women.

The figures of this series are 21 males and 6 females and Wassermann reaction was positive in only 2 cases out of 27 cases. Patients usually apply for treatment 7 to 8 months after the appearance of symptoms and the disease on the whole has a short natural duration (about 16 months) involving the glands of the neck in the early stages.

One of the series had a nodule for 2½ years in the lateral aspect of the left side of the tongue. The average duration was six months.

In a consecutive series of 27 cases of all varieties of malignant disease admitted it was found that the patient had symptoms for varying periods as follows :—

Penis—1 year 1 case, 1½ years 1 case, 2 years 2 cases.
Breast—1 year 1 case, 2 years 1 case.
Lower jaw Papilloma—10 years 1 case, one year 1 case.

Tongue—7 months, 1 case, 1 year 1 case.
Stomach—1 year 4 cases, 2 years 1 case.
Cervix Uteri—1 year 1 case.
Sub-maxillary region—3 years 1 case.
Rectum—2 years 1 case.
Face—1 year 1 case.
Cheek—1 year 3 cases.

Sarcoma cheek—8 years. This was an old case and the histological examination was done 8 years ago.

Lip—4 months 1 case.

It is not easy to discover a prolonged cause capable of causing chronic irritation in the tongue. If one actually sees the amount of irritation noticed in the tongue due to the use of chillies, pepper and other condiments day in and day out for prolonged periods (and the amount of irritants used is very great in the Telugu speaking population of the province), nothing can be made out of chronic irritation as an antecedent factor. Somehow all oral cancers do show an improvement after the extraction of teeth and this would mean that dental sepsis is one of the fundamental factors in the aggravation of the disease. But the disease has been seen in edentulous people also.

There was only one case of leukoplakia in this series; he had a weak Wassermann positive reaction. Only two cases of gumma of the tongue had been noticed in the period of 2½ years.

Of this series 20 were males and 10 females.
Of this 2 Anglo-Indian males, 2 females.
Muhammadan 3 males.
Christians 3 males 1 female.
The rest were Hindus.

W. J. Mayo discusses on the use of adrenal extract in combating cancer and remarks that cancer never develops in normal tissues. Then he discusses the close relationship of cancer to chronic irritation :— Cancer of the scalp is common among the Chinese who shave the head with dull and rough edged instruments and is uncommon among the peoples who do not have this practice.

The natives of the country know that shaving of the head leaving a pigtail is universal in the male population (except among some

modern people) from a very young age right up to death and in certain sects among the widows. I have not met with epithelioma of the scalp except in one case which arose in a scar (mentioned *supra*).

The only other case (see photo) arose in the nape of the neck which does not require much shaving.

The other case not included in this series was that of an Anglo-Indian lady who had presumably a sebaceous cyst for many years. It was removed in a Military Hospital. She had a dose of radium in Northern India, and when she came here she had a fungating growth proved to be carcinoma by histological examination.

Mayo continues his argument as follows :—

In China the men eat at the first table, when the rice is hot, and their practice of throwing the rice by means of chop sticks with considerable force into the posterior part of the pharynx and the first portion of the oesaphagus results frequently in cancer in this situation. The Chinese women who eat at the second table when the rice is cold do not suffer so often. The visible growths of naso-pharynx cases had no such causal relationship so far as I could see here.

Cancer of the mucous membrane and the mouth in the Phillipines and parts of India is the result of chewing betel nut wrapped in its leaf with lime and carried almost constantly in the cheek.

The great reduction in cancer of the mouth and gums as the result of good dentistry and in cancer of the lip with the disappearance of clay pipes is noteworthy.

Cancer of the breast so common in civilized women has no corresponding frequency in women of those races who leave the breasts exposed. (This is not correct as we all having many admissions for cancer of the breast). In Kashmir where the natives carry charcoal braziers filled with hot coals strapped to the lower abdomen cancer of the skin just above the pubis is common.

Cancer of the gall-bladder is seldom seen except in connection with gallstones. Why is cancer of the urinary bladder not frequent though vesical calculi are so frequently met with ?

Gastric cancer develops on some type of precancerous disease such as ulcer in 25 per cent of cases.

This percentage varies according to the pathologist. There is no undue preponderance in the Gosha or Muhammadan community. The Malayalees of the village type who do not keep their breast covered suffer equally from it.

The numbers in this series of cancer of the breast are as follows:—

Europeans	4
Anglo-Indians	2
Muhammadans	3
Christian	1
Hindus	18
Total ...	28

While Gastric cancer leads all other carcinomas as a cause of death in the human species in other countries it is one of the rarest neoplasms in all other species. Thus among dogs in which new growths are extremely common, exceeding the occurrence of neoplasms in man, cancer of the stomach is almost unknown. Forshner states that among 70,000 sick dogs there was not a single case of cancer of the stomach, although ulcers of this organ seem to occur frequently in the dog. The entire alimentary tract of all the lower animals seems to be comparatively free from cancer, if we except anal tumours in dogs. In his extensive review of the literature Caspar could not find a single case of cancer of the pharynx or oesophagus in any species. The only exception to this statment is furnished by the bovines in which squamous cell carcinoma of the rumen is by no means infrequent; the rumen is a true dilatation of the oesophagus. No case of true carcinoma of the stomach has even been described in the bovine. A similar state of affairs exists in the horses. Shiker could find no recorded cases of cancer of the stomach in sheep, swine or cats in all of which cancer has been observed in other locations.

Spontaneous primary tumours of the stomach of rats must be most infrequent for among 100,000 rats examined by McCoy in his plague work, in which he found 103 tumours, there was not a single case of neoplasm anywhere in the gastro-intestinal tract.

Neoplasms of any kind are extremely uncommon in rabbits. Wild animals rarely have neoplasms of the stomach. Only one non-malignant

tumour has been described in the stomach of a cold blooded animal (Python.) Only one case of cancer of stomach has been described in a primate in autopsies on 381 primates, it was a female monkey aged 8 to 10 years. In spite of the enormous number of mice autopsied in laboratories and the frequency of cancer in these animals, there are only four cases of primary neoplasm of the stomach in this species. They all belong to the same category with the stomach cancer of the horse which involve almost or quite exclusively the squamous portion or rumen.

Although intestinal cancer is not extremely rare in the lower animals, expecially in birds, yet in mice it is no more common than is cancer of the stomach. Despite the prevalence of macro parasites in the alimentary canal of all lower animals neoplasms of this tract are so infrequent.[17]

People eat their food in a hot condition and drink more tea and coffee, at least certain sections of the population. The food is highly seasoned with condiments. In a total of 450 abdominal sections in a year only 15 cases of cancer of the stomach were met with and no cases of malignant disease of intestines. There was a case of sarcoma of jejunum recorded by me [18]. Although cancer of the stomach is less common it is met with in all types, castes and creeds. One American lady who had carcinoma of the stomach had 3 years previously undergone an operation of hysterectomy for carcinoma of cervix. There is a slight preponderance of Muhammadans in this series.

When cancer of the mesoblastic structures occurs, the preceding source of chronic irritation is probably biochemical in nature.

There are two views as to what happens in chronic irritation in relation to cancer: first it is believed that some micro-organism or other outside agent enters the body and gives rise to cancerous growth. If this were true, secondary cancers would show the histo-pathological characters of the organ in which they occurred whereas they show those of the original lesion. For instance, if a cancer originating as an adenocarcinoma of the mucous membrane of the stomach extends to the liver by metastasis, the new growth proves to be not a cancer of the liver, but a cancer of the mucous membrane of the stomach in the liver, proving that the malignant cell itself has been transplanted to the liver,

and is itself parasitic. Second, it is equally probable when a breach of continuity in the tissues occurs as the result of a long continued chronic irritation, the attempt is made to heal with normal cells, but in course of time as the reparative process are exhausted, less and less mature cells are thrown into the breach until finally embryonic cells replace the normal epithelium and take on malignant characters.

The age of the cells and their condition must play a prominent part in the development of malignant disease. The reason why cancer usually appears after middle age is that the cells of the body have lost the reparative power of youth, have a lessened immunity and therefore become vulnerable. Those organs of the body which have relatively a short heredity are more often involved than organs which we know to be more primitive and which might be said thereby to have gained hereditary resistance to the disease. The frequency of cancer of the stomach and of large intestine and rectum which might be called modern organs of convenience, as contrasted with the infrequency of cancer of the more primitive small intestine, with its ancient heredity is suggestive, malignant disease of the testis which is the primitive organ is rare as contrasted with many varieties of malignant disease of the ovary.—a relatively recent organ derived from the primitive testicle The incidence of cancer of the breast and the uterus in women at the menopause, is great whereas in man there is no such frequency of cancer in the generative organs because no comparable senile change takes place. Although Mayo favours the chronic irritation theory a good deal it would appear from his arguments that it is the "*tissue changes*" whatever might be the cause, senility, loss of balance of biochemical factors or loss of endocrine balance generally after a certain age period which are the most important factors.

The nature of cancer immunity or resistance (homologous) remains still obscure. It must be due to the difficulty of demonstrating any anti-body in an immunized animal, especially in its serum as in the case of bacterial immunity.

Whether the state of active resistance against cancer is localised or generalised :—Experiments [19] by subcutaneous inoculation of certain mouse tumours or certain normal mouse tissues show that the immune state extends to internal organs—the lungs and the peritoneal cavity. In other words the resistance is not localised but is distributed all over

the body of immunized animals. This fact allows the assumption of the presence in immunised animals of some substance which is able to cause resistance and which is distributed throughout the body of such animals.

W. C. M. Leuis from Liverpool [20] reported the influence of normal and cancerous blood serum on pancreatic lipase action. There is an abnormality in cancer serum in that it contains less of the lipolytic co-enzymes than does normal serum.

Confirmation of the results are lacking but these experiments tend to show that it is important to look after the whole organism and not only the growth itself or that there are changes in the body which lead to a growth.

Blair Bell [21] and Todd [22] had studied the Bio-physical and Biochemical factors of cancer tissue and I have reported a series of cases treated with lead [23].

Todd [24] has again studied those conditions and has come to the following conclusions :—

In the cases which showed response to lead treatment the small lymphocytes and eosinophil leucocytes of the blood showed an increase ; in cases which did not respond, this blood change was not observed.

The normal fat-splitting enzyme of the blood which was usually increased in late cancer showed a diminution when the treatment was being effective.

Cancer tissue and the plasma of cancer patients show a poverty of calcium. Acid base equilibrium of cancer patients and animals show that in pre-cancerous states and in cancer before cachexia has developed, the patient is alkalotic.

3 gm. of calcium chloride is given daily to increase ionised calcium by acidosis, to correct alkalosis, and to furnish a depot for calcium assimilation. Fat soluble vitamins are given in large doses especially vitamine D as Radiostoleum or pure D to increase calcium absorption and to combat any infective element.

Collip, parathormone, given by injection, appears to have a definite retarding action in mice implanted with trout carcinoma and is used in the Soho Hospital and Westminster Hospital, London [25].

Thyroid extract stimulates metabolism and immunity processes.

Liver extract is useful to combat anaemia.

Sampson Handley in his Hunterian Lecture on Papilloma considers it as closely related to carcinoma.

Papillomata are found not only on mucous membranes but also on the mucous lining of minute excretory ducts.

He surveys many regions :

Tongue :—Leukoplakia, *i.e.*, a state of Papillomatous hyperplasia precedes cancer of the tongue in 3 cases out of ten. This statement is not proved in our series.

Larynx :—Laryngeal cancer precedes a papilloma.

Stomach :—In the 11,000 cases reviewed by Prof. Stewart there were 236 cases of cancer of the stomach but only 47 of gastric Polypi. In the bowel as well as in the stomach carcinoma might tend to destroy the evidence of its origin. The margin of a chronic ulcer of the stomach, as of the leg is exactly the site in which a local septic lymphangitis must frequently produce papillomatous hypertrophy. Lockart Mummery and Dukes have shown that the evolution of a carcinoma is accompanied by the disappearance of papillomata in adjoining parts of the mucosa. Hauser, Hongetozny and Menetrier think that carcinoma is preceded by chronic gastritis—adenoma. Hauser describes adenomatous changes around chronic gastric ulcers.

Small intestine is almost immune to carcinoma except at its lower end. Handley associates this fact with the unique activity of lymphatic absorption in this part of the intestine. It can hardly be an accident that where the lymph circulation is at its maximum the incidence of carcinoma is minimal.

Large intestine.—Lockart Mummery associates intestinal cancer with polypus and multiple stalked adenomata; intestinal polyposis is a familiar disease the tendency to which is strongly hereditary. Dukes studied 75 cases and concludes that the papillomata are commoner in the early than in the late stages of rectal cancer and are not a secondary product of the irritant stages of the growth. Soon after a carcinoma starts papillomata in its neighbourhood tend to atrophy and disappear under some obscure process of immunisation. In Dr. Susman's opinion there is a common cause for gastro-intestinal cancer and polypi.

Breast.—Sir Lentheal Cheatle shows that changes are confined to one part of the breast and they affect mainly the small ducts just before they open into the acini. Clinically carcinoma and precancerous papillomatous hyperplasia were frequently found in the same breast. Cheatle compares the processes with tar carcinoma. Bacterial infection through the ducts as catarrhal infections of the uterine cervix and nose are possible.

Lupus carcinoma.—Rather rare but 122 cases have been collected by R. Asihara; all Lupus carcinomas originate in areas of papillary hypertrophy.

Carcinoma of chronic ulcers.—The neoplasm is preceded by chronic thickening and warty hypertrophy of the surrounding skin : ulcer may be present for a long time (even 25 years.)

Thyroid.—Multiple adenomata of thyroid may lead to malignant disease.

Occupational cancer.—Percival Pott 150 years ago pointed out that cancer is at first a local disease and it starts in simple warts as in chimney sweep's cancer of the scrotum.

Leitch who specially studied cancer control and occupational cancer detected the action of sebaceous secretion of the scrotum in dissolving an active agent from the soot particles, points out that the kangri cancer of Kashmir, the cancer of cheek and gums, arsenic cancer and aniline cancer of bladder are all associated with preceding papillomatous formations.

Our experiences.—I have no experience of kangri cancer : scrotal cancer is not met in this series except one case of papillomatous growth of the scrotum. In cancer of the cheek 50 per cent of cases are seen with papillomatous hypertrophy. Carcinoma in chronic ulcers of legs after a long time has been seen. Breast illustrates many cases where duct papilloma after 2 years became a carcinoma, insufficient operations for localised non-malignant tumours were followed in some cases by malignant growths. One case of multiple adenomata of rectum showed malignant changes on section. Tongue also shows such evidence. Some of the stomach cases were operated on for duodenal or pyloric ulcer.

Pre-cancerous inflammatory changes in the sub-epithelial tissues.—Waledyer, Ribbert, Borrman and Victor Bonney have made a close

study of the connective tissues in carcinoma. Bonney says the hypertrophy of the epithelium only develops after the sub-epithelial changes are established and these changes are invariably characterised by increased cellularity. Billroth said "Without previous chronic inflammation cancer does not exist." These changes precede papillomatosis.

This occurrence has remained a basic but isolated fact. Cheatle minimises its importance. Handley suggests that they are the result of a long standing local chronic lymphangitis—a process which in elephantiasis produces hypertrophic changes in the connective tissues, associated with papillomatosis.

Pathology of the papilloma.—Handley says it cannot be understood without a knowledge of the lymphatic arrangements of the skin. He showed—("Lupus in its surgical aspects"—Annals of Surgery, January 1922), that the axis of each papilla of the skin is occupied by a central lymphatic vessel terminating blindly towards the apex of the papilla, but joining below its base with 4 or 5 more similar lymphatics from adjacent papillae (as the fingers join the hand) to form a single vessel. By the union of a group of these vessels in the superficial third of the thickness of the dermis horizontally running lymphatics are formed which uniting by groups and changing their direction, pierce the deeper layers of the epidermis, again unite by groups in the subcutaneous fat, and run vertically through the fat to join the fascial lymphatic plexus.

This is confirmed by a specimen which Professor Hyrtyl of Vienna presented to the Universily College many years ago; this is an injected specimen of the lymphatics and Professor D. T. Harris drew attention to this.

Each papilla of the skin is provided with a separate drainage system, and the lymphatic vessel lies in the axis of the papilla but is always separated from the overlying epithelium by a layer of connective tissue. If the fibrous layer of the skin is considered, nearly all the lymphatic vessels are found in its superficial third. In the deeper two thirds of the dermis the lymphatic vessels are comparatively scanty, and run verticaliy in company with the blood vessels.

With these anatomical details he correlates certain pathological facts. In elephantiasis a band of round-celled infiltration is often seen

in the superficial third of the dermis. Lupus affects exclusively the superficial third of the dermis. In Paget's disease of the nipple a band of round-celled infiltration is often found in the superficial third of the dermis. In moles the naevus cells affect the superficial third of the dermis without ever quite reaching the epithelium. All these conditions are genetically related to the lymphatic system. They are all associated with papillary hypertrophy or with the appearance of papilloma.

It is true that Handley has not blocked a papillary lymphatic and seen a papilloma arise but short of experimental demonstration, the proof of origin could hardly be conclusive. The elongation of the papillae in a papilloma is not due to downgrowth of the interpapillary cell columns, for, the relation of the deepest part of these columns to the hair follicles deeper down remains unaltered. Morcover in conditions of papillomatosis the inter-papillary epithelial cell columns tend to atrophy and disappear, a clear proof that their role is a passive one. They are the victims, not the agents of pressure.

Malignant tumours may arise in naevi without any preceding process of chronic inflammation, such as is usually seen in other cancers. There would appear to be some factor at work in naevi which acts as a substitute for chronic irritation and inflammation. The characteristic mucous cells, closely aggregated, pigmented or unpigmented connective tissue cells occur chiefly in the superficial third of the dermis, *i.e.*, the lymphatic zone. This fact suggests that the naevus is an area in which the cells which should produce the lymph vessels have proliferated irregularly and have failed to form the lymphatic network. This conclusion is formed by the frequency of papillary hypertrophy which in the typical warty naevus reaches a high degree of development. The excess of pigment in naevi indicates some defect in metabolism and can also be interpreted as due to a defective circulation of tissue fluid, such as would result from lymph stasis. Von Recklinghausen, Baner, Borst all hold that the peculiar naevus cell groups found in moles are produced by the proliferation of the endothelium of lymph vessels and spaces. Von-Recklinghausen gave to moles the name lymphangiofibromata. Borst found in moles lymphatic vessels still recognisable but partly filled up with naevus cells pigmented and unpigmented. He could also recognise thickening and proliferation of endothelium of the lymph vessels. On the other hand he found no such changes in the blood vessels.

The problem of pre-sarcomatous conditions has hardly been approached. Warty moles may become the seat of carcinoma or sarcoma. Sarcomata arise not upon surfaces but in the depths of connective tissue.

Is there any connection between Elephantiasis and cancer? A lady who had lived in India for many years went to England with typical Elephantiasis of one leg. She was persuaded by a friend to try radiant heat baths for the leg and shortly afterwards multiple epithelio-mata, twenty or thirty in number, appeared on the skin of the affected leg. The regional glands became enlarged and she died in a few months. (Sampson Handley).

Cases of elephantoid ulcer are subject to irritation by heat and light in this country. I have not met with a case of epithelioma in such a case. Epithelioma of urethra supervening on strictures of urethra, carcinoma supervening on old strictures of rectum or diverticuli have not been met with. Professor M. J. Stewart [28], reviews the pre-cancerous lesions of the alimentary canal including the latest review of the Mayo-Clinic records of 1,800 cases of diverticulosis and concludes that diverticulitis is of no practical importance as a pre-cancerous condition.

Experimental Study of cancer.

Experimental study of cancer started some 30 years ago and its course might be divided into 3 periods. The first began with the work of Jensen and Borrel on transplantation; the second was marked with the work of Fibiger and Yamagiwa and their followers, in which the production of cancer de novo in normal animals was achieved. The third period overlapped the second and embraced the work of Peyton Rous, Blumenthal, Gye and Barnard and others on the possibility of micro organisms entering into the mechanism of cancer origins.

Jensen and Barrel at the end of last century showed that cancerous growths could be propagated in series in normal animals of the same kind by the introduction of fragments of original growth under the skin. The constant repetition of the same features in a succession of experiments on transplanted cancer in mice permitted the conclusion that the cancer cell behaved as it did because of the differences inherent in it, or permanently imposed on it and not because of the peculiarities of the individual in which the growth had risen. Jensen also observed that an animal which had resisted a first transplantation was more immune to a

second transplantation though when workers began to use this process of immunity for transplanted tumours they found that even very energetic methods of immunization did not avail to stop the growth once it had started.

The second period of cancer research concerned itself with the production of cancer de novo not merely with its continuation and transplantation. Cancer might arise from exposure to products of shale or coal distillation or to physical agents such as heat, ultra violet rays and X-rays. The growths produced by tar on mice were described and the cancerous proliferation did not begin all over the area to which the tar was applied. Cancer was not a direct response to the irritant action of tar. After the process had started the growth still went on though the application of tar was stopped. The tar evidently set up a condition which made the cancerous change possible. If a tar cancer was produced in an animal and then removed by operation, a second tar cancer was more difficult to produce. It was true also that a second cancer was more difficult to produce if the first had been a spontaneons cancer which has cleared up. It is the failure to realize the invulnerability of young and healthy subjects which is one of the causes of so many unsuccessful inoculation experiments.

Gye's Work [29] of 1925 is familiar to all pathologists.

The wide ditribution of cancer throughout the vertebrata, with the resulting great diversity in environment, food and conditions of life generally, was suggestive of the omnipresence of a specific malevolent agent of great vitality with regard to fluvial and marine fishes found bearing cancerous growths, this fact might well suggest that the specific cause of cancer is water-borne and that it is not injuriously affected by sea water; the neoplasms found in fish are identical in every way with those occurring in man.

Treatment of Cancer.

Treatment of malignant disease on surgical lines has been laid down on sound principles after mature experience and study by Bultin, [30 & 31], Sampson Handley [32], Cheatle, and Sir Holburt Waring[33]. Radium has been taken in as an aid recently as one of the useful therapeutic measures in the treatment of malignant disease. The principles of treatment, its limitations and usefulness are detailed below.

Brief history of radium.—In 1895 Roentgen announced the discovery of X-rays. In 1896 Henri Beequerel followed out the suggestion

of Henry Poincare that rays similar to X-rays might accompany the excitation of feuroescence in salts. He discovered similar rays in Thorium. A long series of researches by Monsieur and Madame Curie, Rutherford and others has brought to light more than 30 different chemical elements, each of which continuously and spontaneously radiates these extraordinary rays.

Immediately after this (1900) Danlos employed the rays from radium salts in the treatment of certain skin diseases. Thereafter radium therapy grew as fast as the salts could be obtained.

Later principles of filtration and cross fire were introduced by Wicham Degrui and Dominici. In 1912 the Radium Institute, London, gave numerous treatments with radon. These rays produce marked physiological effects when the pass through tissues.

The easily absorbed rays should be cut off by interposing sheets of metal between the radio-active substances and the tissues, for these rays would not reach the deeper lying tumour tissues and might produce excessive destruction of the superficial layers of tissues. The idea of cutting of the easily absorbed rays by means of sheets of solid substances and allowing the more penetrating rays to filter through is known as the *principle of filtration.*

Destruction of superficial tissues in cases where this is to be avoided may be very much reduced by placing the radio-active applicators in several different positions about the tumour, and radiating it from different angles. With this distribution of applicators all the rays that reach tumour do not pass through the same areas of superficial tissues and the destructive effects in them all diminished. The idea of allowing the rays to come in different directions to cross each other in the tumour is called the *principle of cross fire.*

The rapidity with which the radiation diminished at points further and further removed from the source is often underestimated. The intensity of radiation from a point source diminishes as the square of the distance from that source, even though there may be no appreciable absorbtion of the rays by the matter through which they pass. *This inverse law* has an important bearing on the technic of radio-therapy.

In the prolonged exposures the destructive effects in certain kinds of tumour tissues seem to be more marked, as compared with the destructive

effects of normal tissues than in the shorter exposures to more intense rays. In spite of this early knowledge it was not followed in practice.

In the General Hospital, Madras, $RaSo_4$ is being used. The sulphate is used for direct work as it has a high radium element content and being insoluble loss is minimised. The container is generally of 0 5 mm. platinum thickness and some of 0·6 mm. platinum thickness. The applicators vary in size from 1 to 8 Sq. cms. containing 2·5 to 10 milligrammes of Radium element per sq. cm.

The 0·5 mm. platinum screen is sufficient to screen off all the Alpha rays and practically all the primary Beta-radiations.

Introduction into the tissues is controlled by the empirical observation that the gamma radiation from a milligram of radium can, in a period of about 5 days destroy the cancer cell in a c.cm. of tissue. The total amount of radium required in milligrams is thus the volume in cubic centimetres of the tissue to be irradiated, although in the case of large growths, from the effect of cross radiation a smaller quantity will suffice.[35]

Effects of radiation on tissues.—Radiation acts as an irritant to the tissues and induces the production of an inflammatory exudate. Both serum and cells are poured out: cells are polymorphs which are replaced by lymphocytes and plasma cells. Eosinophils are often present in large numbers. They are defensive because they are abundant in those cases which respond best to radiation. Lymphocytes gather as a result of lymph stasis and complete destruction of cancer cells may follow this accumulation of lymphocytes. Fibroblastic reaction occurs and the final result is dense fibrosis. Thrombosis of the vessels in the area also occurs. Fat is highly resistant to radiation. It forms a poor defence against cancer cells which grow into the fat and so escape the attack of lymphocytes.

Hence the poor result of radiation of axillary fat in carcinoma of the breast. In bones, the danger of repeated radiation is production of chronic irritation osteitis which makes the bone hard and brittle and liable to spontaneous fractures.

Ewing gives the relative radio-sensibility of tumours as follows:—

(1) Lymphoma, lymphocytoma, lymphosarcoma, myeloma.

(2) Embryonal tumours :—carcinoma of testis, ovary, basal-celled carcinoma.

(3) Cellular aplastic adult tumours :—Round celled carcinoma and diffuse carcinoma.

(4) Dermoplastic tumours :—carcinoma simplex, Fibrocarcinoma, squamous carcinoma.

(5) Adeno-carcinomata of uterus, intestine, breast.

(6) Fibroblastic sarcoma, osteosarcoma, neurosarcoma.

In the case of malignant growths of organs which have no capsule *i.e.*, mamma, tongue, or pharynx, hardly any interval of time exists between the onset of the disease and its spread into lymphatics.

This has a great bearing in treating malignant growths of these organs.

Histologically and clinically the ulcerative variety is a more malignant cancer. This form produces metastases earlier

Radium.—Slow destruction of tumours by Radium is better than their more rapid destruction since it allows the production of immune substances.

Action.—Radium acts by bringing about the death of the living cells and when used in therapeutic doses the death is not sudden. The cells retain for some time their normal appearance but they cease to grow or divide. Gradually they lose their staining reaction and are finally absorbed by the phagocytic cells of the surrounding tissues. The effect is greatest upon the cells of squamous epithelioma and least on glandular carcinoma (intestine.)

No therapeutic doses of irradiation were capable of occluding lymphatics. Arteries and veins might be occluded and that is how the growth shrinks in size. There is a drop in the lymphocyte count during irradiation and a drop is an indication to proceed slowly with irradiation.

Prophylactic irradiation can be given by means of external applications for periods up to 3 weeks. The French school advocate the treatment of the lymphatic area before the primary lesion, either by dissection followed by prolonged external irriadition or by external

irradiation alone, on the ground that the presence of radioactive substances in the mouth may have a stimulating effect on outlying parts.

Removal of the jaw in cancer of secondary invasion and removal of bulky masses after irradiation by diatheramy are required. Second treatment is less effective than the first one. The first one must be thorough. If a second dose is required the dose must be smaller.

The radio-sensitivity of a tumour is manifested by its regression after a given dose of external radiation. When rapid regression of a tumour occurs in these circumstances it is a radio-sensitive tumour. From this point of view the treatment of highly radio-sensitive tumours would be solved were it not for the fact that these tumours are usually the most malignant, and therefore are accompanied by wide and rapid diffusion over the body ; lymphosarcoma, carcinoma of the base of the tongue, tonsil and nasopharynx and certain types of breast carcinomata belong to this category.

The rapid disappearance of a lymphosarcoma in the mediastinum or a transitional celled carcinoma in the lymphatic glands of the neck after external radiation does not depend on the method of radiation so much as on the great radio-sensitivity of these tumours.

Certain tumours that are not highly radio-sensitive regress under external radiation provided they are superficial and not too deeply infiltrating. The explanation of this fact is that the whole of these tumours is so close to the source of radiation that their resistance is overcome (Squamous celled carcinoma and rodent ulcer). A highly radio-sensitive tumour will regress whether it be superficially or deeply situated, provided all its cells are within the range of external radiation. Nearly all malignant tumours whether radio-sensitive or radio-resistant, regress on interstitical radiation, the reason being that the tumour cells of radio-resistant tumours are so close to the source of radiation that their resistance is overcome.

All means of radiation are at present unable to prevent the death of a patient in whom a carcinoma has spread to such a degree that the disease is no longer localised in the immediate area in which it began, but has spread more extensively in that area and has also reached other parts of the body.

The regression of a tumour depends also on another factor, *i.e.*, the reaction of the tissues in which the tumour lies. Dr. W. Cramer was the first to point out that the changes in the stroma which follow on radiation play an important part in the process which leads to the regression of the growth. Mottram adduced experimental evidence on this point. He subjected transplanted tumours growing in mice to a dose of radiation known to be sufficient to produce regression of the tumour. He then transplanted these radiated tumours, in gradually increasing intervals after radiation (1, 2, 3, 4 or 5 days and so on) into fresh mice. He found that the tumours which had been removed and transplanted one or two days after radiation grew almost as well as a normal non-irradiated tumour, but if the irradiated tumours were removed and transplanted after a longer interval their growth in the new mice was at first much less active and eventually they failed to grow altogether. This experiment shows that it was the prolonged presence of radiated tumour cells in the organism of a radiated mouse which contributed to the lethal effect of radium. He attributed the effect on the organism of the host to an effect on the blood vessels. Later experiments disproved that it is not the effect on the blood vessels. The detrimental effect upon the radiated tissues in which the malignant epithelial cells are present has been ascribed either to deprivation of blood supply or to the contracting effect of cicatricial tissue that kills the epithelial cells by the pressure it exerts. This explanation is untenable because the normal tissues can resist at all events temporarily, the extension of rodent ulcer. The lines at which rodent ulcer often become arrested correspond to the boundaries of nerve areas.

There is no mechanical, blood vascular or lymphatic vascular arrangement that can arrest growth at the boundaries of a rodent ulcer.

At present the precise relationship of this clinical observation to the failure of radiated tissues to allow the growth of transplantable tumours in them is not clear. This is another example of some inexplicable power possessed by the tissues of being able to resist the invasion of a growing epithelial tumour.

We have no experience of Radon seeds in the treatment of carcinoma.

Teletherapy.—" A temporary bomb " was prepared and was in use for a fortnight at a time with 250 mgs. It was extensively used. But

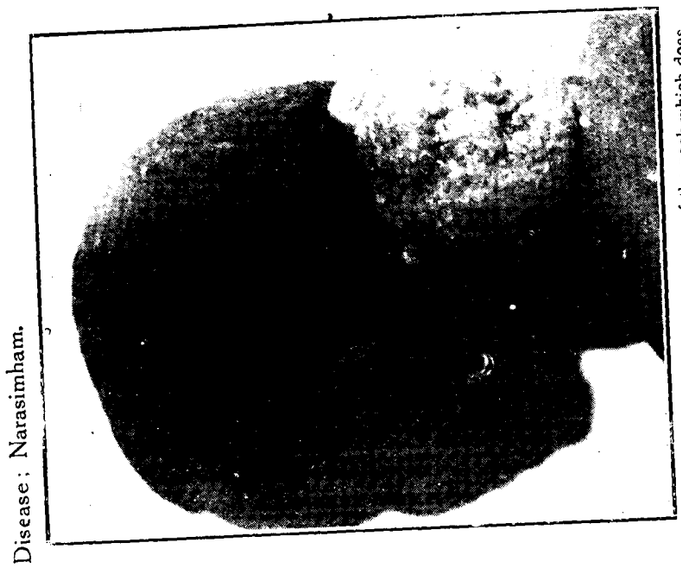

Fig. 2. Epithelioma of the nape of the neck which does not require much shaving (Ref. Mayo's views on cancer of the scalp among the Chinese.)
—*Photo—X-ray Institute, Madras.*

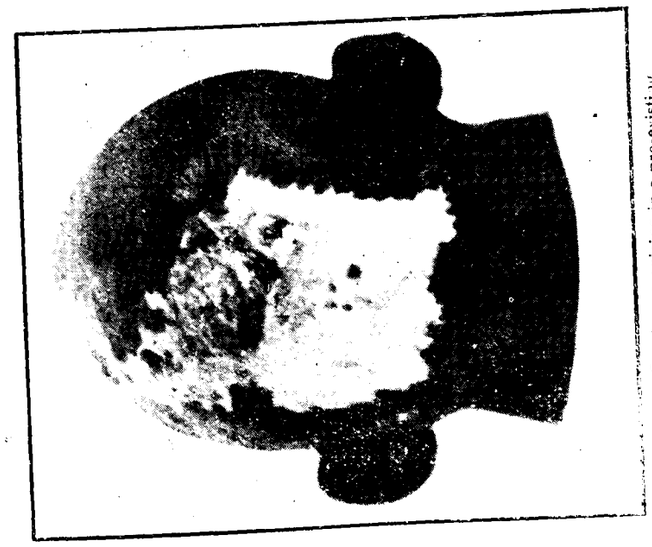

Fig. 1. Carcinoma arising in a pre-existing scar of 20 years' duration
—*Photo—X-ray Institute, Madras.*

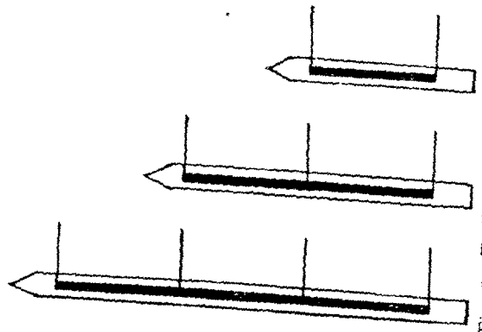

Fig. 3. To illustrate the principle of "active length" of radium needles.

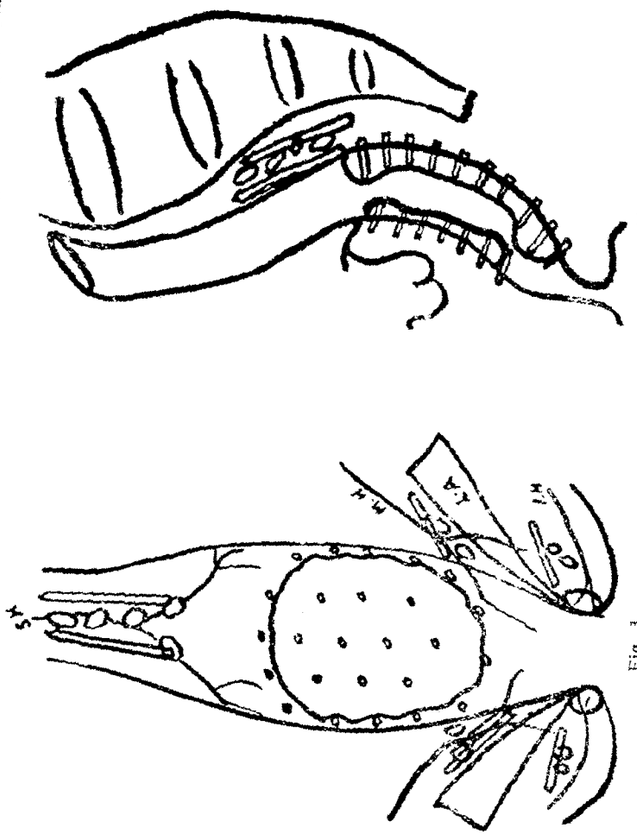

Fig. 4.

Figures 3 and 4 illustrate the method of irradiation of rectal and anal cancer after Gordon Watson.

it was found very inconvenient to lock up 250 mgs. for a fortnight. A special room and a permanent bomb were prepared by Captain Barnard of the X-Ray Institute, Madras, but its use as a routine was abandoned, as the method was found expensive. It was however used in a few cases. Useful information cannot be elicited on the merits of this method as it was used only for a fortnight in November 1929.

Greater distance does enable one to irradiate usefully to a greater depth, for the reason that the necessary intensities can then be maintained without producing destructive effects. Deleterious effects upon the blood are more particularly seen when irradiation includes such organs as spleen, liver, heart and bone marrow. Moreover the greater the volume irradiated the greater the effect. The patient absorbs more energy by Teletherapy.

The other methods of applications are :—

(1) *Cavitary method* May be used in rectal, vaginal, and oesophageal cancer. Radium is introduced through the natural opening and maintained in position by means of holders which vary according to the anatomical site. It is simple but its use has been abandoned owing to the difficulty of distributing the irradiation equally throughout the lesion. (See Figures 3 and 4)

(2) *Interstitial irradiation*—This method consists in the introduction of platinum needles containing radium and provided with points and eyelets. The needles are all secured in position by means of sutures and retained for 10 days or more. This is the method we used in the majority of cases. The advantages of this method are (*a*) the possibility of calculating the dose carefully and accurately, (*b*) Homogenous irradiation, (*c*) Prolongation of the period of irradiating since all tissues are protected by the multiplicity of foci and maximum screenage.

(3) *Surface application* :—By this is meant the application of radium at a short distance from the skin. The method of applying redium directly on the skin was discarded because a cutaneous reaction runs before the optimum dose of irradiation to the underlying growth has been given. The usual standard distance from the skin is 15 mm. and in certain cases a greater distance is used. The needles are arranged on the outer surface of a mixture of bees wax, paraffin and saw dust ; so that they lie at the desired distance from the skin (useful for Keloid, angioma, brain tumours, etc.)

Histology before and after Radium.

(1) Section of tissues taken after radium exposures under the low power shows a general sparseness of the cells; there is not the same compactness and massing together of the cells seen in the section of tissue before Radium.

(2) The protoplasm of the cells after Radium is scanty, mostly absent being represented by vacuoles of different sizes and also stain more readily with eosin (a character of degenerate protoplasm and necrotic material).

(3) Nucleii show varying degrees of karyorrhexis and karyolysis. In some places one sees only portions of the nuclear remnants in a corner of a vacuole which was once the protoplasm.

(4) The changes in main are necrosis of protoplasm of the epithelial cells, karyolysis and karyorrhexis of their nucleii.

Causes of failure.—Insufficiency of irradiation intensity, wrong or improperly spaced dosage. Harmful effects upon the blood and haemopoeitic system, necessitating cessation of treatment. Depression of functions of glands, liver kidneys, thyroid and pancreas with deterioration of general health. The effects of irradiation are purely local and is evidenced by the steady march, whilst one group of metastases is vanishing, of others beyond the field of irradiation. This was markedly seen in two cases.

General.

Effects of radium on the patient have been studied by blood examinations; absolute counts of red blood cells and leucocytes and differential leucocytic count before and after radiation in the earlier stages. This has been omitted now for want of time and also because experience has shown a guide in the dosage. Patients generally experience pain for the first 2 or 3 days which relieved by sedatives.

A fourth hourly chart is useful. I attribute some importance to the rise of temperature in the radium cases; it might mean local sepsis, tissue necrosis, pulmonary complications as an idea of the effect of radium on the consitutional factor of the patient. It would be best to diminish the dosage if the temperature is keeping up. Sarcoma cases on handling show a rise of temperature and I know two breast cases in their final stages who had a high rise of temperature without any lung complications.

Ten cases of cancer showed no rise of temperature.

One case of angioma showed no rise of temperature.

Eight patients showed rises of temperature (2 sarcoma and 6 epithelioma). Of these one case of sarcoma was running a temperature previous to treatment and died a few weeks ago. The other case of sarcoma had a secondary deposit in a week after treatment. Of the 6 epithelioma cases, both cases of breast cancer (women) had high rises of temperature, in a case the condition improved very much but the other breast and the lungs were affected. The secondary growth in the other breast was confirmed by a pathological examination. She died some time later.

Two cases which have returned now in a bad condition did not show any rise of temperature. One of them showed signs of local reaction the other one had to be operated on under anaestheisa to remove a needle by incision.

Sloughing.—Occurred in the earlier cases especially with the needle screened by mono-metal and before certain essential principles were well realised.

Birkett of Manchester first stressed the importance of using the needle of the same *active length* of anywhere between 10 to 30 mm. for the same case so that the time of exposure may be uniform. (See Figure 5.) I did not realise the importance of this in the earlier cases. Using needles of different active lengths leads to sloughing unless case is taken to remove the needle with the stronger dose at an earlier date by careful grouping and marking and this again is against a fundamental principle of small dosage with longer exposure.

It is well to review the cases treated by the old method which was in vogue till 1927, *i.e.*, a heavy dose for a short time. Of the 75 cases admitted in 1928, 56 cases were treated with radium and the following is the result :—

Dosage employed.—Was generally 30 mgs. for 40 to 48 hours. The classification of cases dealt with is given in a previous page; only one breast case, one rectum case and one tongue case survived for treatment in 1929, the rest were dead before December 1929; the above mentioned 3 cases all died in 1930.

(*To be continued.*)

Visualization of the Urinary tract*

By N. Mangesh Rao, F.R.C.S.

Direct visualization of the anterior, the posterior urethra and bladder can be done by means of instruments as the urethroscope and the cystoscope. Visualization of the upper urinary tract, *i.e.*, above the bladder is carried out by the help of roentgenography, using a medium that renders the tract opaque to X-rays, but at the same time is harmless to the patient. Compounds of iodine in some form or other have proved to be the best for this purpose.

Pyelo-ureterography is indicated in (1) Renal haematuria especially if unilateral. (2) Abdominal pain especially when unilateral and of uncertain origin. (3) To demonstrate the relation of the upper urinary tract to abdominal swellings of doubtful nature. (4) To find the relationship between radiographic shadows of doubtful nature in the line of the ureter and the upper urinary tract. (5) Obscure cases of renal infection.

Ascending pyelo-ureterography.—The patient is given a dose of analgesic as potassium bromide grs. 20-30 two hours previously and the cystoscope passed in, under local anaesthesia with every aseptic precaution. A small sized ureteral catheter (No. 5 Charrier) is passed up the ureter and a warm solution of radiographic-opaque material is slowly injected. It should be stopped as soon as the patient complains of pain in the loin. If the catheter is passed right up to the renal pelvis it can be emptied and filled with the opaque material. Complete distension of renal pelvis is necessary except in hydro-nephrosis, as incomplete distension may resemble a filling defect by neoplasms. In hydro-nephrosis complete distension is risky, in that the wall being thin and pain absent even on full distension, rupture may occur without being appreciated. In other cases pain or discomfort is felt on full distension. If this pain resembles the one felt by the patient previously, that kidney would certainly be the culprit. A normal renal pelvis takes about 5-7c. cs. but anything above 10 c. cs. would require the greatest care in injection. By passing a small sized catheter over-distension is prevented as the fluid can run down the ureter by its side. As soon as the patient

* For the Skiagrams the author is indebted to the Second Surgeon, General Hospital, Madras, and the X-ray Institute, Madras.

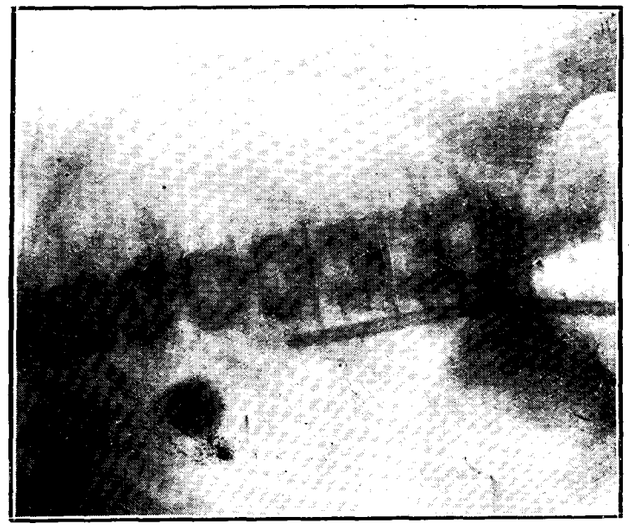

Fig. 2. Calculus in the right kidney.

Fig. 1. A normal pyelogram obtained by injection of sodium iodide solution into the left ureter.

Fig. 3. Shadow of Pelvis and Calyces of right kidney obtained by injection of sodium iodide solution. Note that the shadow shows a mottled appearance due to the presence of calculi.

Fig. 4. Calculus impacted at the lower end of the right ureter. Figs. 2, 3 and 4 belong to the same patient.

Visualisation of the Urinary Tract : Mangesh Rao.

Fig. 5. Right kidney shows double ureters ; Pelvis with accessory kidney tissue above the normal kidney.

Fig. 6. Retrograde method : Right kidney shows only partial filling of the pelvis—obstruction in the renal pelvis. The left kidney shows a normal shadow.

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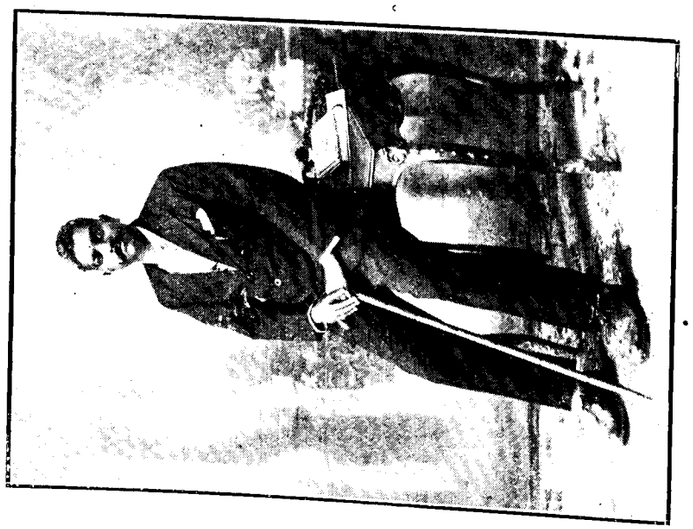
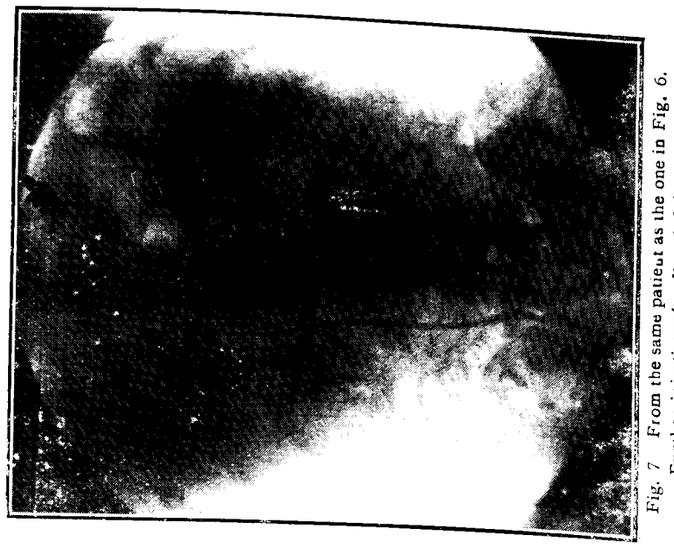


The late Dr. G. L. Kantha Rao, L.M.S.



Visualisation of the Urinary Tract: Mangesh Rao.

Fig. 7 From the same patient as the one in Fig. 6. Further injection of sodium iodide solution shows a negative shadow in the renal pelvis of the right side.

feels discomfort the injection should be stopped. This is the reason for not giving a general anaesthetic. If necessary an injection of morphia may be given after the pyelogram has been taken.

Medium used.—Usually a sterile 15 per cent solution of sodium iodide in distilled water is used. Uroselectan 15-20 per cent solution in distilled water may also be used as being more opaque and less irritating. The solution should be at body temperature.

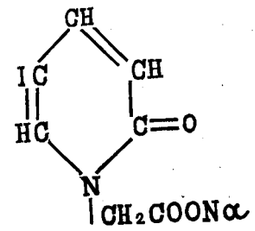
Reactions.—Pain, nausea, shivering may occur occasionally. In some cases vomiting, haematuria or fever may occur. Iodism is rare. The possibility of rupture of the renal pelvis in hydro-nephrotic cases should be kept in mind.

Contra-indications for ascending pyelograms.—(1) Acute inflammations in any part of the urinary tract. (2) Severe chronic urinary sepsis as cystitis, pyelonephritis etc. (3) Where there are signs and symptoms of renal inefficiency or advanced bilateral renal disease. (4) Very old or very young persons. (5) Debilitated and emaciated patients. (6) Where violent reaction occurs to instrumentation. (7) Where it is possible to diagnose by other methods especiallyin tuberculosis of the kidney where ascending pyelography is not advisable.

Descending Uregraphy by intravenous injections.

This method has been successfully used in the last two years. Two drugs chiefly used are Uroselectan and Abrodil. Both are organic compounds of iodine, and are excreted by the kidneys without undergoing any change or liberation of iodine.

Uroselectan is a Sodium salt of 2-oxy-5-iodo-pyridin-N-acetic acid with the formula.



This is readily soluble in water and is eliminated by the kidneys in concentration sufficient to give satisfactory skiagrams of the urinary

tract. It produces no toxic effects. Occasionally a slight shivering in patients has been noticed. The functional capacity of the kidneys can be graded by estimating the concentration of the drug in the urine and the time taken for complete excretion of the drug. It contains 42 per cent iodine and its excretion from a normal kidney is 60 per cent in the first two hours, 20 per cent in the third hour and 15 per cent in the next four hours. It is excreted completely in eight hours. The Sp. Gravity of the urine is raised to 1040—45 in the first two hours.

Dosage.—Infants and children	20 c. cs. of 40 per cent solution.	
Children up to 6 years	40 c. cs.	,,
,, ,, 12 years	60-80 c. cs.	,,
Adults	100 c. cs.	,,

40 grammes are dissolved in 110 c.cs. of redistilled water, the powder being added little by little while the solution is stirred. Then it is filtered and boiled for 20 minutes. Then it is allowed to cool to body temperature, its volume being reduced to 100 c.cs. by this boiling. The solution is injected slowly into the cubital vein, taking about 10-15 minutes, in two doses of 50 c.cs. each with an interval of 2-3 minutes between the doses. The patient may feel thirsty and warm but no other toxic symptoms are seen.

Abrodil is a sodium non-iodo-methane sulphonate, $ICH_2 SO_3 Na$ and contains 52 per cent iodine and is more soluble in water, up to 70 per cent.

Dose for adults is 20 grammes dissolved in 80 c.cs. of redistilled water and proportionately in children.

It does not change on boiling, produces no toxic effects, nor does it give off free iodine. Any leakage outside the vein causes no trouble except slight pain. It gives a better shadow owing to higher iodine content and is more soluble. A smaller dose is also an advantage.

Preliminary preparation of patients :—Bowels should be emptied on the previous day by Pulv. Glycerrhizae Co and an enema in the morning. Fluids should be restricted for 12 hours previously. Pictures are taken, the first 15 minutes, the second 45 minutes and third 75 minutes after the injection. Bladder should be emptied before taking pictures so that the lower ends of ureters are brought out well. In cases

where kidney function has been damaged, there will be delay in excretion and so pictures should be taken later. The use of Potter-Buckey diaphragm and pressure by an air-cushion on the lower abdomen brings out the pictures better.

Sometimes in cases of pyelitis a mild rigor may occur.

Preliminary clinical examination, urine-analysis, and examination of blood urea must be done first. This is followed by intravenous urography. After this cystoscopy is carried out if further information is required. Then if necessary, confirmation is done by retrograde pyelography as in tumours of the kidney.

Advantages :—It is less troublesome to the patient than a retrograde one. In addition to visualization of the urinary tract a rough estimate of the excretory capacity of the kidneys can be made out. It can be carried out safely where retrograde method is either contra-indicated as in tuberculous nephritis, acute or severe chronic sepsis of lower urinary tract or severe haemorrhage from urinary organs, or where it is difficult to carry it out as in infants and young children, in cases of enlarged prostate, thimble bladder, where ureters have been transplanted into colon, ureteral openings are inaccessible being in avesical diverticulum, or in retroprostatic pouch and in bad strictures of urethra especially with chronic sepsis in addition. In cases of ureteral obstruction or a bifurcated ureter or where instrumentation is followed by severe reaction, this method will be safer and successful. The retrograde method may be used subsequently as complimentary to the above, when further information is required.

Obstruction in the neck of the major and minor calyces cannot be demostrated by retrograde method as well as by the intravenous method. Relationship between a tumour in the abdomen and both urinary tracts can be made out without much trouble to the patient. Both urinary tracts being visualized simultaneously a camparison can be made between the normal and the abnormal. In hydronephrosis no risk is taken and the picture comes out at a later period by gradual concentration.

Interpretation of roentgenograms obtained by this method :—

1. If only one kidney is seen it may mean absence of the other, destruction by atrophy of the other or anuria.

2. If only calyces and pelvis are visualised but not the ureter, it may mean block at pelvi-ureteral junction by stone, growth, pressure of artery growths outside, kink of ureter, etc.

3. If the affected side can still be visualised even after the healthy side shows no shadows, it may mean a partial block repairable by a plastic operation.

4. Non-opaque stones come out at first as negative shadows (clear areas) but later as ringed shadows, provided the kidney is still functioning.

Small ureteral stones, an opacity in the line of the ureter as by calcified gland, tumours of the kidney and polycystic kidney require confirmation by retrograde pyelograms. A cystogram if required may be also taken by the intravenous method after visuali zation of the upper urinary tract is over.

Contra-indications for its use :—Acute infections of urinary tract, in latent or manifest uraemia, acute pyelitis and pyelo-nephritis. Retrograde method is required in cases of tumours of kidney, polycystic kidney, small ureteral stones, etc., as it gives a better picture of calyces and ureter. The intravenous method should be followed by cystoscopy for confirmation, for collection of urine from individual kidney or retrograde pyelogram where it is required.

A New Foe of Germs

By Dr. G. V. Satyanarayana Murthi, m.b.,

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In the year 1896 Hankin published the Annals of the Pasteur Institute of Paris, that the waters of certain rivers in India possess an extremely marked antiseptic action for bacteria in general and for the cholera vibrios in particular. Thus the water of the Jumna, as it leaves the town of Agra contains more than 100,000 bacteria per c.c. while some five kilometres further down the bacterial content is only 90 to 100 organisms per c.c. Further a sample of this water when filtered free of all bacteria and tested for its bactericidal property on the cholera vibrio is found to possess a strongly antiseptic and bacteriolytic action, while the same filtered sample when boiled is found to be lacking in such a virtue. Thus a very important heat-labile bacteriolytic substance was suspected in the waters of the Jumna and similar observations were made on the waters of the Ganges. Though further research was not carried out by Hankin regarding the nature of this substance, he, however, came to an important conclusion that no one gets cholera by ingesting the river water, that rivers are never the carriers of epidemics, and that cholera spreads from down stream upwards.

In 1901 Emmerich and Low published a communication in which a reference was made to a certain 'Immuno protedine pyocyanease' substance possessing an extraordinary bactericidal power not only for the pyocyaneas bacillus, but also for several other bacteria such as the organisms of anthrax, diphtheria, typhoid and plague.

In the year 1901, an English worker, Twort by name, noticed instances where certain cultures of bacteria on which he was working became transparent and the matter from these cultures had the power of destroying colonies of the same bacterium. As a matter of fact, the destruction of bacterial cultures by some unknown factor was not at all unusual. Bacteriologists had, indeed, often noted that after a culture had grown to a certain point, it would stop, and finally clear up. They were accustomed to call such cultures " suicides " and let it go at that.

It however remained for the brilliant brain and restless spirit of d'Herelle to unravel the mystery of this bactericidal substance and to interpret its potential utility and significance to the individual and to the humanity at large. Born in Montreal in 1873, educated there in Paris, d'Herelle was a man moved by an unquenchable thirst for research, which took the brilliant and adventurous scrientist to the four corners of the earth.

In 1901 d'Herelle while investigating in Mexico a certain bacterial disease of locusts found a cocco-bacillus in the excreta of the effected locusts. The artificial cultivation and utilisation of this cocco-bacillus for the destruction of the locusts was found to be of great importance as the locusts were causing enormous damage to the crops. While cultivating the cocco bacillus on solid media d'Herelle found areas entirely free of growth existing in the midst of confluent colonies of the cocco-bacillus; and he came to the conclusion, after careful investigation, that these clear spaces were not actually sterile but were colonies of a living organism too small to be visible, even when present in large numbers. This in fact was his first observation which in future years was to lead him to the elucidation of the Bacteriophage principle.

There was in 1915, stationed near Paris a squadron of cavalry suffering from an epidemic of dysentery. D'Herelle was making cultures from the excerta of patients from this unit, when one day an unusual occurrence attracted his attention—the growth of dysentery bacilli on the surface of agar media showed areas which were clear, in other words without growth and therefore apparently sterile, although they were entirely surrounded by an area of growth. This was certainly peculiar and recalled to his mind his earlier observation with regards to the cocco-bacillus of locusts.

In August 1916 be entered into a thorough investigation of a case of acute Bacillary Dysentery (Shiga.) Each day about ten drops of the stool was placed in a tube of broth. After incubation over night the suspension was filtered through a chamberland candle to get rid of the organisms of dysentery and the filtrate which contains the other invisible filter-passing ingredient is subjected to a further examination with a view to find out its action on the organism of dysentery. Every day the filtrate was added to a 24 hours broth culture of B. Shiga, and though nothing happened in the early days of the illness, it was found

one day that the broth culture of B. Shiga was rendered sterile by the filtrate, and the broth itself was turned transparent due to the lysis of the B. Shiga. On this particular day it was found that the patient who was all along seriously ill with profound toxæmia has turned a new leaf and had stepped into a definite convalescence leading to an ultimate recovery. D'Herelle attributes the commencement of the convalescence and recovery to the development of the bacteriolytic substance which he terms the bacteriophage (phage : to live at the expense of.) The bacteriophage principle becomes more and more active, the more it is fed on the Shiga bacillus. It in fact becomes regenerated at the expense of the Shiga bacillus, which it destroys. It behaves like a filterable organism parasitic of the bacterium.

But what is the nature of this material we have been calling the bacteriophage? What is it like, and how does it act? D'Herelle's theories are worth quoting. He believes that there is no doubt that it was a living unit, but does not feel he can say much, as yet, about its nature, whether it is a member of the plant or the animal Kingdom, though he inclines to the view that it is a definite biological species. For convenience he calls the members of his species ultra-microbes, for he believes them to be 2,000 times smaller than an average sized bacterium. They are not visible through the microscope and even the ultra-microscope reveals them as very minute, brilliant points. A liquid could contain several million of them to every cubic centimetre and yet appear perfectly clear. They pass readily through filters which keep back the bacteria. In fact d'Herelle separates the two by the very simple expedient of filtration.

His investigation of the mode of action of the ultra-microbe has led to very interesting discoveries. It appears that the bacteriophage might be called a bacterial parasite, for it actually enters the bacterium and grows at its expense. He believes it to be a definite living entity which can assimilate and reproduce, giving, in the process, a secretion which destroys the bacterium by causing it to disintegrate. The bacteriophage, now multiptied to ten or twenty, is set free to attack other bacteria.

It would appear, however, that the bacteriophage does not always emerge victor in this contest. Sometimes it does not emerge at all. Just as the human body is able to resist the bacteria to which it is constantly exposed, so the bacterium itself is sometimes able to nullify

the effects of the secretions of the invader, developing what is called an immunity. It may be that the invading bacteriophage is not very powerful, in which case it may not be able to multiply and its secretions may be destroyed. It may be that the bacterium will develop a protective coating which the phage cannot penetrate; or it may have a high natural resistance. If the organism survives the attack it may become very powerful; it might be said that it is sick with bacteriophage but recovered, for the bacteriophage may be looked upon as a disease of bacteria.

The interplay between the bacterium and the bacteriophage is very similar to that between the onslaught of bacteria on the body and the resistance of the body cells to the attack. When harmful bacteria multiply in the body they give off a substance called a toxin which has destructive action on the cells. These, so stimulated, respond by the production of a neutralising secretion called the antitoxin. Although many factors are involved in the fate of a body attacked by disease the mutual action of the secretions of the cells and those of the bacteria is one among many which determines the course of the disease. If the bacteria are vanquished, the body cells, for a time at least, are less susceptible to another attack by the same organism.

D'Herelle's discovery now makes it appear that in addition to the already complicated problem of toxin and antitoxin and immunity there is still another factor to be considered in this struggle in the body; for while the bacteria are pouring forth toxic substances they themselves are being attacked.

Consider the course of a disease from this new viewpoint. When the dysentery bacilli enter the intestine they may find already present a type of bacteriophage which is especially active against them, in which case the invading organisms are killed off at once and no illness develops. However, the bacteriophage may not possess this virulence at the time of the invasion, but may be capable of evolving it. The more rapidly it evolves it, the more speedily the disease is checked. There is a third possibility, for the bacteriophage may be absolutely inactive against the invader, or the bacteria may be extremely resistant in either event the invader flourishes unchecked and the unfortunate victim dies. D'Herelle also believes that there is only one kind of bacteriophage, as opposed to the earlier view that there was a different kind of ultra-microbe for each

type of bacterium. He believes there is one species which exists in a number of different strains, some of which are particularly active against one type of organism and some against others, but that the more virulent will attack many different kinds. In his opinion it is only a question of time and work until a strain is isolated which will attack all bacteria.

This struggle between the bacterium and the bacteriophage protobe which occurs in the infected individual is reproduced on a large scale during an epidemic. As long as the bacteriophage is not in evidence the epidemic spreads by leaps and bounds, but once a virulent type of the phage appears in an individual, it reaches the whole community through the same channels of infection by which the infecting microbe reached them, and this presence of the phage leads to the recovery of the infected and the protection of the susceptible. The epidemic itself is thus terminated.

At present, however, bacteriologists seem to be too engrossed in finding out how the phage acts in the laboratory and in discussing its true nature, to spend much time in adopting its use to the public welfare. Such work has been done is but a start. Franklin, when he drew the lightning from the sky, and started the study of electricity, did not dream—nor did any of his contemporaries—of telegrams or cables, radios or electric toasters. The bacteriologic work is in the same position. It has a discovery on its hands which it does not know how to harness. One investigator tries this, another something else. An optimist sees the entire conquest of infectious diseases lying around the next corner. Once find out what it is that keeps the bacteriophage from acting in the body with the same force that it acts in the test tube, once set it free from the inhibiting influences of substances present in the human organisms, adapt it to destroy more than one kind of virulent organism, then one disease after another may well fall before its onslaught.

I am much indebted to Dr. S. Ramakrishnan for the valuable help and sympathetic encouragement during the preparation of this article.

Some Modern Ideas on Immunity Reactions.

By N. Seshadrinathan, M.B.B.S., D.T.M.

(*King Institute, Guindy.*)

The study of the process of active immunization is a fascinating one. It is a vital process in the sense that it can take place only in vivo; but the immune state can be studied by test tube experiments.

The immune reaction is directed against the chemical action of a reagent in the shape of a foreign protein. This foreign protein is called the antigen. The altered or superadded serum constituent of the animal is called the antibody. This antibody has been found to be far out of proportion to the antigen that stimulates its production. Hence, it would seem that the action of the antigen is like that of a catalytic agent.

The antigens so far studied have been shown always to contain protein matter. The aminoacids which are the cleavage products of protein matter cannot act as antigens as they are diffusible, and can be dealt with by the cells. The antigen molecules are larger and remain in the colloid state. Their poisonous effects are neutralized by the antibodies that they themselves stimulate.

Certain substances adsorbed or loosely combined to the protein molecule of the antigen so modify the immune reaction that the serum behaves specifically to a solution of the loosely combined substances both in the free state and in the combined state. These substances by themselves are incapable of provoking the production of antibodies.

The site of production of the antibody has been a matter of speculation. Does it arise in the liquor sanguinis? or from tissue cells? If the latter, which tissue cells? The possibility of its developing in the liquor sanguinis is supported by the fact that the serum contains this antibody in abundance; and by the fact that such a serum, does not show any qualitative alteration of its constituents, but only a quantitative one. Against this possibility is the fact that repeated bleeding does

not deplete the antibody content of the serum, but it is kept up evidently by secretion from the tissues. Anaphylaxis is closely related to the process of antibody production, and it has been abundantly proved that the antibody is present in the tissue cells in spite of thoroughly washing the tissue to free it from any serum (Dale's phenomenon). It would seem therefore that many tissue cells can produce antibodies, but the reticulo-endothelial cells have been held more responsible for the process than any other cells. (Tissue culture experiments of Meyer and Lowenthal, 1927-28. Topley 1930.)

As to the nature of the antibody very little is known. It seems to be linked with a group of protein molecules of the liquor sanguinis, *viz.*, the globulins. Whether it is merely a physico-colloidal alteration of the normal globulins of the blood and tissues or some substance adsorbed to the globulins is not known. It has never been isoloted in pure form apart from the globulin nor can we presume that the globulins themselves are the antibodies, since the glolubins of normal serum have no protective value. It has been noted that the serum globulins are often increased in the process of active immunization; but it has not always, corresponded with antibody increase.

Immune bodies have been till now described as consisting of more than one variety, *viz.*, precipitin, haemolysin, agglutinin, complement fixing, etc. Modern research assisted by the study of colloids has practically simplified these as different stages and aspects of the same immune reaction.

Ehrlich described antibodies as consisting of a first order, second order, and a third order, according to the number of serum constituents required to complete the reaction. Bordet however persisted in believing in the existence of a single antibody corresponding to a single antigen, with different phases during the process of immunization. This unitary theory has been gaining general acceptance recently, and Zinsser has brought out almost conclusive proofs to support it. In this theory attempt is made to describe immunity reaction in terms of colloidal chemistry. The results of immune reactions closely simulate the behaviour of colloids in test tube experiments. Pathological sera are said to be in a disturbed state of colloidal equilibrium.

The substances involved in immune reactions are all dissolved or suspended colloids; so far it has not been possible to produce immune bodies from crystalloids; the antigen has always been a colloid.

Colloids come between dissolved substances and undissolved precipitates. The particles in a colloidal solution (called a sol.) are larger than the dissolved particles of crystalloids and smaller than suspended or sedimented precipitates. The colloidal suspension or solution is said to exist as a dispersed phase in a dispersing medium. Certain colloids are called protective colloids. These have got the power of forming a film round the fine particles of metal sols and preventing their aggregation of the dispersed metal. The effect of electrolytes or ionizable salts on colloidal suspensions is to bring about aggregation of the particles. Under certain conditions the reverse effect is produced, *viz.*, aiding to keep the dispersed state stable. This aggregation results in flocculation of the sol, which may be reversible or irreversible.

The above properties of colloids form the basis of the interaction between the antigen and the antibody.

Whether antigens are proteins in every case or not, they are always colloids. In their interaction with antibodies they behave like colloids. The effect of antitoxins on toxins is to neutralize or destory the poisonous effect of the latter. Is the reaction a chemical or physical process? Ehrlich concieved it as a chemical process, as between an acid and a base. Bordet held that it was a mere adsorption phenomenon of the two colloids, the toxin and the antitoxin. The latter theory explains best many of the observed phenomena of toxin neutralization, as well as other immunological reactions, for example, the zone phenomenon of inhibition (a typical colloidal phenomenon) or reversal of reaction by an excess of one reagent, and the ' Danyz effect ' of unlike results produced by the same quantity of agent when added in single or in fractional doses.

This simple colloidal adsorption theory is not able to explain the specificity of the immunological reaction, consequently there is a tendency at present, to add a chemical aspect to the toxin antitoxin reaction.

The tendency is, at present, to consider that all the so called varieties of antibodies are non-existent, but that there is only one antibody for every antigen. The varieties of reactions such as, precipitation, agglutination, complement fixation, etc., are manifested during different phases of the same reaction under different circumstances. Zinsser has named this the " Unitarian " hypothesis, and presented much of the

evidence in its favour. " If the antibody comes in contact with a very finely divided antigen as in a bacterial extract, or in, let us say, horse serum, if electrolytes are present, and perhaps other necessary physical factors furnished by the presence of serum, etc, precipitation occurs. When we are dealing with whole bacteria of relatively large mass and correspondingly small surface exposure, agglutination is the result," (the adhesion phenomenon observed with trypanosomes, filaria, etc., come under this category).

" When alexin is present complement fixation or haemolysis or bactericidal effects result, since the changes produced by the sensitization have permitted union with the complement. When there are leucocytes present the union makes possible the phagocytosis of the antigen, and when the antibody is adsorbed by the cells of an animal, anaphylactic ' sensitization ' occurs." (Zinsser, " Infection and Resistance," 1923, p. 319.)

The reaction of toxin with the corresponding antitoxin does not appear to fit in fully with the above hypothesis. True toxins have not been identified as proteins, the neutralization of toxin by its corresponding antitoxin takes place in a quantitative manner, and hence may be considered a true chemical reaction like that of an acid and an alkali, except for its specificity. The points against this view are : one is that their reaction curve resembles more an adsorption curve of colloids the other objection is what is called the Danyz effect, *viz.*, when an excess of toxin is added to its specific antitoxin in several portions at proper intervals of time, there is left much more unneutralized toxin in the mixture than if the same quantity of toxin had been added to the same quantity of antitoxin at one time. This phenomenon is characteristic of colloids. A third factor is that the neutralization is not accompanied by any marked alteration in either the toxin or the antitoxin, so that they are liable to be separated by fairly simple processes. Bordet described the toxin antitoxin neutralization as an adsorption phenomenon, in which two colloids of opposite electric charges take part. This theory explains the zone phenomenon, the " Danyz effect " etc., but does not explain specificity of the antitoxin required to neutralize.

" Nicolle would even include the toxin antitoxin neutralization in the same class as the antigen antibody reaction. He maintains that true toxins and their specific antitoxins precipitate each other." (Chemical Aspects of Immunity, H.G. Wells.)

The toxin, however, cannot be identified with the corresponding bacterial antigen nor the antitoxin with the corresponding bacterial antibody. If we consider the toxin as a separate antigen produced by the bacterium concerned whether as a secretion from itself or by a change effected in the medium in which it grows, the toxin antitoxin reaction comes in line with the other antigen antibody reactions, giving rise to a precipitin reactions.

The unitarian hypothesis has not been free from objections.

1. In active tuberculosis there is a diminution in the opsonin content of the serum, but an increase in the complement fixing power, suggesting that the opsonin is different from the complement fixing antibody ; here however, it is possible to explain that in active tuberculosis a substance is formed which prevents the opsonic phenomenon, while not interfering with the complement fixation phenomenon.

2. Another important observation that does not fit in with the unitarian hypothesis is that the different antibodies appear to be associated with different fractions of the proteins salted out of the serum, *viz.*, the water soluble pseudoglobulin associated with the antitoxin, opsonin, hæmolysin and antibacterial immune body, and the water-insoluble euglobulin with the precipitins, agglutinins. anaphylactins, and complement fixing antibodies.

But this observation has not been consistent in the hands of all workers. For example, sometimes it has been found that the agglutinins are associated with two fractions of the proteins.

Moreover the chemical nature of the different protein fractions of serum have not been well defined.

The immune body concerned in the anaphylactic reaction also appears to be idential with that concerned in precipitin and other reactions. Here the antibody is fixed in the cells and when a further dose of antigen is introduced precipitation within the cells takes place giving rise to the characteristic anaphylactic shock. The actual poisonous product which results from such an interaction is not known. Histamine poisoning which resembles most the anaphylactic reaction, has been proved not to be the cause of this phenomenon.

The present position regarding the 'unitarian' hypothesis may be best expressed in Zinsser's words " we do not wish by any means to convey the impression that we consider the 'unitarian' view as absolutely and rigidly proved. We do believe, however, that the denial of such a view necessitates the assumption that the injection of a pure antigen calls forth five or six fundamentally different reactions on the part of the tissue cells, a theory which would be justified only on the basis of in controvertible proof."

BASIS OF THE IDEAS EXPRESSED ABOVE:—

1. Chemical Aspects of Immunity, Wells, 1929.
2. A system of Bacteriology in relation to Medicine, Vol. VI, 1931.

(MEDICAL RESEARCH COUNCIL.)

3. Colloids in Biology and Medicine, Bechhold, 1919.

Medical Research in Excelsis.

By V. Iswariah, B.A., M.B. & B.S.

Research in medicine has very appropriately been called progressive medicine as against the ordinary practice of medicine or curative medicine. Between the method and outlook of curative medicine on the one hand and progressive medicine on the other, there are definite inevitable and sometimes profound divergences. Curative medicine is mostly clinical while progressive is mostly Laboratory. To a clinician the diagnosis or to recognise the known is the end point. To the researcher to face the unknown is the aim. Curative medicine deals with the individual while progressive medicine is collective in its outlook. In curative medicine Samaritanism—the greatest guiding force of medicine—is in practice in progressive medicine it is much more distant and therefore less obstrusive a motive. Self-confidence is by general consent one of the essentials in the practice of medicine, for it breeds confidence, faith and hope. Diffidence by equally general consent is an essential quality in investigation, for it breeds enquiry.

But the term Research very often conjures up in the mind of many, a form of fashion in the academic world as a particular dress or car in society. The routine in education or in the medical profession is done by the average ordinary mortal, and Research is taken up by the extra-ordinary and the select. This has had a baneful influence in every one seeking to be dubbed a Research worker or scholar. Research worker needs to be of a sterner stuff than the ordinary average. He should be a genius. But genius is not at all identified with brilliance in mind. Genius as Leslie Stephen put it began where intellect ended. Genius has been recognised to be just the infinite capacity to take pains or as colloquially put by Edison the discoverer of wireless ten per cent of inspiration and ninety per cent of perspiration. In this sense a Research worker is expected to be a genius.

Research dubbed on some is apparently and obviously a grotesque misfit. The point that strikes one here is that Institutional Research is infinity of less value than individual Research. The history of medicine goes to show that the greatest discoveries and the greatest advances have

been made by workers who have worked along independent lines and who have not been under the control of any special Research or other committee always on the outlook for reports and publication. A great Research worker remarked (1928) that the great National appeal for cancer Research has actually killed cancer Research. When asked to explain he said " Because we are out for something big—something that will appeal to the people. The man who has been working quietly and steadily in his own laboratory—hampered perhaps by want of funds—is likely to be absorbed into an institute—his initiative will be crushed because he has to work along a plan made by the director ; money which could be used to finance the individual workers will go to the erection of buildings. Team work in institutions has been tried but men of experience are looking forward to the funeral rather than to the festival " Protogonists of this line of argument go a step further to say that discoveries are not only individual but accidental. George Stephenson discovered the steam engine when boiling water for tea in a kettle. Archimedes discovered his law of specific gravity when having a dip in his bath tub. Sir Issac Newton when scheming perhaps to get apples from the neighbour's orchard discovered the law of gravitation. The more Research is freed from the shackles of organisation and deliberation the better for its progress.

But the sad interpretation of Research as on outing for vital discovery has brought in its train deplorable tendencies. Truth is sometimes subordinated to exigencies and sometimes strained and mutilated to corroborate preconceived ideas. The desire to rush to the press at the earliest occasion is always seen. James Beattie said in 1928 that it would be a good thing if the scientific Medical Journals could be suppressed for a few years so that much of the undigested literature of to-day might find its legitimate way to the waste paper basket before and not after publication. It was Sir Thomas Lewis who referred last year to the serious aspect of the widespread encouragement of transient research in that such work rarely possesses scientific value yet the reporting of it has acquired a recognised commercial value and its realisation in the latter way becoming much more often than not the real good.

It was said previously that research is able to make itself attractive for the reason that it signified to many something fashionable or above the ordinary in the academic world. The so called Research sometimes attacts men for a less noble it not ignoble reason. Dr. Johnson said in

talking of politicians that patriotism was very often the last refuge of scoundrels. A slight adaptation of this was available for defining Research as the last refuge of a clever idler. One who is aversed to a disciplined or timed work in his daily routine very often prefers Research because it gives scope for laxity. A Research woker may keep himself engaged for days perhaps sometimes in reading, sometimes in watching etc. The genuine worker is forced to do so pressed by the keenness and intent spirit led by the very work. The bogus worker arranges the work according to his desire of convenience.

There is yet another ignoble motive that activities the worker to pursue his Research. This is of special application to the subject of pharmocology and therapeutics. Finding a useful potent drug or a compound readily administrated is a work fruitful of much speculation. The incidents connected with the discovery of one of the most valuable Antimony compounds in India illustrates this point. To have such ideas as the goal of Research as also to encounter such temptations in the course of Research started with wholesome object are some of the snares of Research.

In India there is yet another special field for medical Research—the attempt to investigate and unearth the previous medicaments from the mass of unsorted material in the indigenous systems of medicine. The true worker here as in natural science can owe no allegience to any tradition however venerable or any master however beloved. He can only serve and express the truth and for him the truth is that which can be tested by the touchstone of time as for a naturalist to appeal to nature.

There is another class of "Reasearcher"—The statistician. Extreme views are held about this worker. He is sometime called the cheap investigator as he merely tabulates others' work from the register. Others claim for him a place second to none in the domain of Medical Research. Every experimental investigator according to him is to draw inferences only with the aid of a statistician. Truth lies obviously somewhere between these extreme views Time alone could assess the real value of this worker.

It has almost become the fashion of every renowned man who is addressing a gathering of scientific men in India to bemoan the absence of the spirit pf Research in young men. One should beware lest a false

sense of academic prestige or a blind emulation of sister institutions is the incentive and not the necessity of a work of a particular nature that awaits investigation by a being himself thirsting to do it. It is time that eminent men who bemoan the lack of the spirit of research try to direct their thoughts to the curing or healing of the disease that threatens to affect the Research worker.

Sir James Paget said "The Medical Profession appears the most complete and constant union of those three qualities which have the greatest charm for pure and active minds—Novelty, utility and charity" Is there a tendency to challenge this statement by the members of the so called Progressive medicine or medical research workers ?

Case Reports

A Case of Acute Yellow Atrophy of the Liver.

(By G. R. Parasuram, M.R.C.P. and A. Vasudevan, M.B. & B.S.).

Rajammal, Hindu, Female, aged 35, was admitted to the Mental Hospital, Madras, on 27th May 1921. She was a case of Dementia Praecox. She refused food off and on and had digestive troubles. At other times she used to eat well and put on weight. She was admitted into the Hospital Section on 9th August 1931 for refusal of food for a week, loss of weight for two months and vomiting the previous night. Her motions were examined and round worm ova were present. On 11th August 1931 she was put on 2½ Grs. of Santonine. Her bowels moved, but no worms were passed. She was rather drowsy. On 12th August 1931 she suddenly became jaundiced. The same night she developed convulsions which continued till 3 a.m. the next morning and stopped with an injection of Luminol. She was also collapsed and her pupils were dilated. She was unconscious throughout. She was put on stimulants. The next morning, *i.e.*, 13th August 1931 there was suppression of urine and an ounce of urine was drawn out of the bladder. The urine showed plenty of bile. Enema result was poor and the motion was clay coloured. Saline with soda bicarb was given. Blood showed leucocytosis. She expired at 11 a.m. Just before death she had slight twitchings of the arms.

Post-mortem Notes:—Liver small—weight 28 ozs. and was bile stained. Spleen small in size, all abdominal organs bile stained. Plenty of bile all through the alimentary tract. 20 large round worms were found in the intestines. Heart fatty, lungs normal, nothing abnormal in the other organs.

Naked eye appearances:—The liver is much smaller than normal. It is yellowish green in colour. The capsule is wrinkled and numerous small pale areas, of the size of a pin's head are seen. On cutting it, the section is yellowish green in colour. The lobular markings are indistinct.

Microscopic appearances:—The lobules are not clearly seen; the normal architecture of the liver is absent. There is atrophy of liver cells. A few cells are seen scattered here and there in an irregular manner, in some places in groups. Fatty degeneration of the cells is seen in many places. There is round celled infiltration, granular debris and yellowish pigment in the intercellular tissue. The appearances are those of acute yellow atrophy.

Hydatid Cyst in the Neck.

This case is of special interest owing to the unusual situation of the cyst in the tissues of the neck and also its occurrence in a young girl, aged 9 years.

The specimen was received from the District Medical Officer, Anantapur, to whom we are indebted for the notes. The following are the details available.

"There was a small cyst on the right side of the neck in the posterior triangle at its upper part; skin was adherent to the tumour and the skin bore marks of cauterization. The tumour is of the size of a lime, said to have been existing for the last eight months.

On dissecting the skin, the posterior margin of the sternomastoid was adherent to the tumour".

The specimen received for examination consisted of a gelatinous, soft translucent cyst, of the size of a tennis ball, with a wall about 3 mm. thick. It contained about four ounces of slightly turbid fluid. Particles of the sediment in this fluid and also scrapings from the inner wall of the cyst showed the typical scolices of Taenia Echinococcus (with the characteristic row of hooklets and absence of suckers). A paraffin section from the wall of the cyst, showed the typical chitinous layer outside and concentric layers towards the inner aspect; resembling the wall of a parasitic cyst.

The cyst was therefore a hydatid cyst and its occurrence in a very young individual in an unusual situation is noteworthy.

(M. N. P.)

Editorial

The All-India Medical Council Bill.

The draft Bill for the establishment of an All-India Medical Council which has been published in some of the Dailies would have been read with care by medical men all over the country. This question of the establishment of an All-India Medical Council has been engaging the attention of the Medical Profession for some time past and particularly since the unfortunate decision of the General Medical Council in February 1930, medical men all over India have asked that early steps should be taken for the establishment of such a Council. We are glad therefore to note that the Government of India have taken the first step in this direction and we trust that before long such a Bill will be on the legislative anvil.

We do not propose to enter into any very lengthy criticism of the Bill, but we would like to point out that the main reasons for the incorporation of such a Bill are two-fold. First, that an All-India Medical Council would be the means for standardising medical education in this country and for determining the minimum qualifications; second, that it will be the authoritative channel for negotiations with other countries for reciprocal recognition of medical qualifications. The Medical Profession have generally felt that it was exceedingly unfortunate that there was no central authority which could go into the question whether Medical degrees and Diplomas granted by outside agencies should be recognised in this country or not. It is no doubt true that there are Provincial Councils in each Province, and that these Councils can determine the qualifications which ought to be recognised, but it naturally followed that such Provincial Councils cannot command the

same amount of confidence; nor will they be in a position to exert their influence to the extent to which an All-India Medical Council could. From these points of view, we think it unfortunate that the draft Bill does not provide definitely for reciprocal recognition of degrees. We understand that the Conference that was held in Simla in 1930 was emphatically of opinion that without such a provision, the Bill will not be welcomed in the country. It seems to us that this is a matter which deserves further consideration at the hands of Government; and we hope that before the Bill is introduced, it will be possible for them to see that the Council does derive its power of reciprocal recognition in respect of all degrees granted outside India.

We may also assure those who are responsible that they need have no qualms of conscience as regards the degrees conferred by Indian Universities. It is unfortunate if the impression should prevail in this country that these degrees are below the standard or compare unfavourably with degrees in other countries. Such being the case, it is all the more reasonable to expect that in a Bill framed for the constituion of an All-India Medical Council in this country, these qualifications will not be valued or unfavourably compared with qualifications in other countries.

In certain other respects also, it is possible to effect improvement in the Bill. It ought to be laid down that every University with a Faculty of Medicine, should be represented on the All-India Medical Council; and a provision should also be avaliable such that automatically when a new University springs up with a Faculty of Medicine, or an old University constitutes a Faculty of Medicine, such recognition is available.

Difficulties are bound to arise on account of the fact that the Bill does not provide in any manner for Licentiates.

We do feel that Licentiates should also be on an All-India Medical Register, apart from any question of reciprocal recognition of degrees. If the Licentiates do not come on an All-India Medical Register, the question of Medical ethics will be very difficult to solve. We are not suggesting any particular solution, but we are referring to the difficulties that will be created by the exclusion of Licentiates from the scope of the purview of the All-India Medical Council. We hope that the Bill will be suitably amended and passed at an early date.

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It is with painful regret we have to refer to certain questions asked recently in the local Legislative Council regarding some officers in the Medical Department. We realise the supremacy of the Legislative Council and that interpellations are a useful method of eliciting information with a view to serve the general public. We must, however, confess that in regard to the questions about the surgical work done in the General Hospital, the impression in the services must be one of painful surprise that such questions should have been asked. Recently, a question was asked regarding the extent of sepsis in the wards of the Second Surgeon. This is a highly technical matter in which, with due deference, we would have suggested if the member was interested, a demi-official correspondence with the responsible authorities would have served the purpose before launching on a public criticism when that criticism and the inferences to be drawn are absolutely not borne out by facts ; we do feel that Government servants are entitled to seek the protection of the Government from such unfortunate questions. We have statistical records to show that there has been no sepsis in the clean cases operated by either of the Surgeons in the General Hospital ; and we are also in a position to state that the general impression that must have been left by the supplemental question that there is an excess of sepsis in the Second Surgeon's wards,

cannot stand scrutiny in the light of the facts that we have on hand ; nor is it correct to suggest that raw assistants are permitted to do operations. Even if allowed, we have to state the Assistant Surgeons in the surgical side are, highly qualified officers and have had considerable experience and are capable of doing advanced surgical work. The position of Government medical officers will become impossible unless they are protected from such questions which must necessarily leave a very erroneous impression on the public mind and thus deleteriously affect their status and prospects ; and we can only hope that the Government will be pleased to take such steps as may be necessary to prevent a recurrence of this unfortunate state of affairs.

We will add that we have absolutely no reason to fight shy of any method of enquiry that the Government may be pleased to launch when such questions are brought to them departmentally. But we do submit that the mischief is done, whatever the answer of the Government, when such questions are broadcasted through the Dailies and the unfortunate position of the Government medical officer is such that he cannot possibly circumvent this tendency. We therefore appeal, with some confidence, to the Surgeon-General and the Government to protect the services from such unfortunate incidents.

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We hear that the Red Cross Society has inaugurated a scheme for Ante-natal work. Batches of three lady doctors will be posted to the Gosha Hospital, Madras, for training in Ante-natal work. The value of ante-natal propaganda cannot be over emphasised. A good percentage of Infantile mortality is due to ignorance on the part of the un-educated mothers. We are sure this scheme will get into full swing before long and serve to strengthen the future generation of India.

Medical News

Post Graduate Lectures on Tuberculosis.

The Tuberculosis association of Bengal have arranged a series of 20 Post Graduate Lectures and demonstrations on Tuberculosis to be given by special workers on each subject. These are being held fortnightly in the Senate House, Calcutta University.

The Lectures are open to qualified medical men on payment of a fee of Rs. 5 only which also entitles them to become members of the Tuberculosis Association of Bengal for a year. Particulars may be had on application to the Honorary Secretary, Rotunda, Writers Buildings, Calcutta.—*The Indian Medical World, July 1931.*

Under the auspices of the South Indian Medical Union the Havero Trading Company exhibited a movie film on " Neo-Salvarsan " at the Globe Theatre on Sunday 13th September. The film demonstrated the chemical composition of Salvarsan, the process of preparation and the various modifications of the drug. The Bayer Meister Lucius factories, Pharmacological Laboratories etc., were shown. A number of clinical cases of syphilis before and after treatment with Salvarsan and allied products were also shown in the film. There was a large and representative gathering of medical men.

The Annual Prize distribution of the Madras Medical College was held on 28th August 1931 at 5 p. m. Mr. Justice Ramesam, Officiating Chief Justice of the Madras High Court, presided. After the reading of the Annual report by the Principal, Justice Ramesam gave away the prizes and certificates of honour to various candidates, a good proportion of whom were Ladies. He then addressed the audience on the attitude to be taken by them to combat the problem of overgrowth of population. After making a statistical survey of the growth of population in various countries in the different censuses taken in 1911, 1921, and 1931 the birth and death rate etc., he appealed to the audience to face the problem with the true scientific attitude and not to be carried away by public opinion. He referred to the increasing support of the authorities towards birth control and contraception in England, and deprecated the indifference and opposition given to it in India.

After his speech was over, Col. Sprawson, I.M.S., the Surgeon-General to the Government of Madras proposed a vote of thanks to the learned lecturer of the evening.

The Government Tuberculosis Hospital, Madras, celebrated its " Hospital Day " for the first time on October 6th last at Temple Gardens, Royapettah. In the unavoidable absence of the Chief Minister, who was to have presided on the occasion, the Honourable Dewan Bahadur S. Kumaraswami Reddiar, second Minister took the chair. Several notable persons, of both sexes, official and non-official, were present on the occasion. The new " Recreation Hall " built by voluntary contributions from the grateful patients was formally opened. Three wards were " christened " one after Dr. Chandrasekhar, the former Superintendent of the hospital, another after Lannec, the famous French Physician and the third after Trodeau.

The Superintendent of the Tuberculosis hospital, Dr. Kesava Pai, stated in his speech the purpose of the Recreation Hall. Besides serving as a reading room and a hall for recreation in the evenings, it serves as a lecture hall for medical students, and in the near future, for Post-graduates in Tuberculosis. The Viceroy's Thanksgiving Fund in honour of the recovery of the King-Emperor having-been set apart for the Anti-Tuberculosis campaign in India, the hall has come into existence at a time when it is likely to be needed most.

Removal of Appendix an " Assault "

A doctor of Nuremberg, while performing an operation on a young woman, decided in the midst of his task that it was desirable at the same time to remove the appendix.

The woman was highly indignant when she learned what had been done without her consent and instituted proceedings.

An expert summoned as a witness on behalf of the prosecution declared that the removal of the appendix was indicated but was not absolutely necessary. So the court ruled that the doctor had been guilty of technical " assault " and was fined £50, with the alternative of 20 days' imprisonment.

This decision is adversely commented upon, because of the obvious impossibility of a surgeon stopping in the middle of a serious operation to ask the patient how much farther he may proceed.—*The Indian Medical World, August 1931.*

Obituary.

The Late Dr. G. L. Kantha Rao, L.M.S.

Dr. G. L. Kantha Rao, son of the late Mr. G. Ranganayakulu Patrudugaru, Dewan of Bobbili, was born at Bobbili on the 1st July 1885. He completed his early education at Bobbili and Vizagapatam and joined the Medical College, Madras. He graduated from the Medical College in 1912, being the first graduate in his community to do so.

He sat for the Competitive examination for assistant surgeons in 1912 and came out fifth in the list. He was kept on reserve duty at the Government General Hospital, Madras, and was posted to Vizagapatam, Narsapatam and other places. He was also deputed by the Government to Dehra Dun. In 1913 he was appointed as Lecturer of Anatomy, Medical School, Tanjore, after which he served in Guntur, Ongole, Masulipatam and Ellore. He acted as D.M.O. West Godavari, Ellore, for some time last year and was later transferred to Masulipatam. In June 1931 he took charge of the Government Hospital, Bezwada, where his career was suddenly brought to an end.

His death was sudden. He was very energetic and sympathetic to his patients, very courteous and polite to his colleagues. He was a very popular figure in all the places where he served. In his death, his numerous patients have lost a very conscientious doctor; the Madras Medical Service has lost a rising figure, and the Madras Medical Association has lost one of its senior members. We offer our condolences to the members of the bereaved family.

We regret to announce the death on the 2nd of October of Lieutenant Colonel., D. G. Rai, a retired member of the Indian Medical Service at the age of 57. Col. Ganpat Rai served in various capacities in the Madras Presidency. He was for some time Professor of Medical Jurisprudence at the Madras Medical College and Superintendent of the Royapettah Hospital; on other occasions he was the Superintendent of the Medical School, Royapuram and Superintendent of the Medical School

Tanjore. He was District Medical Officer of several districts during the course of his career and he retired in 1929 when he was D.M.O. of South Kanara. He retired in November 1929 from Government Service and was enjoying fairly good health till his death, which was sudden. We offer our condolences to the members of his family.

Dr. B. Iswaraiya, the District Medical Officer of South Kanara died suddenly on the 10th of October at Mangalore at the age of 50. His end was quite unexpected as he was in fairly good health till the time of his death. The Madras Medical Service has been deprived of one of its senior members. We offer our condolences to the members of his family.

Another noteworthy figure has passed off from our midst by the demise of Major-General F. H. G. Hutchinson, I.M.S., in England on July 25th last at the age of 60. He entered the I.M.S. in 1897 and served in various capacities in India. He was the Surgeon-General with the Government of Madras during the period 1925 to 1928 just before he retired from service. The Independent Medical Profession owes not a little to him, for, during his tenure of office in Madras he contributed a great deal towards the extension of the Honorary Scheme of Medical relief in this Presidency. After he retired from service he joined the Council of the British Medical Association as the representative of the Indian Medical Service and figured well in Medical politics. A man of wide experience, tact and sound judgment has been lost to the profession.

By the death of Baron Shibasabuvo Kitasato on 13th June 1931 Japan has lost its most famous bacteriologist and the world a man who made for himself an enduring name in the history of medicine. He was particularly known for three bacteriological discoveries of first rate importance. In 1889 he cultivated for the first time the bacillus of Tetanus in a pure state and having done so he was able to determine with remarkable accuracy the pathology of the disease. In 1890 Kitasato conjointly with Emil Behring made the great discovery of anti-toxic sera and in 1894 Kitasato by himself discovered the plague bacillus and worked out in a convincing manner and in record time the etiology and pathology of plague. It is given to few workers in a generation to establish a finer record—*Journal of Pathology and Bacteriology* G.V.S, *September 1931.*

Reviews.

The journal of Intravenous Medication edited by Dr. D. M. Vasavada, L.M. & S., opens a new era in the field of medical journalism, bringing together as it does all the scattered details of intravenous therapy. It deals at great length with the preparation of the different parts of the patients, different drugs, mode of administration, dosage and effects, more so the pitfalls that may be overooked by the unwary practitioner. It is a very useful adjunct to the average practitioner's armamentarium.

The book entitled " A practical guide to the Edinburgh F.R.C.S." by Mary Keith-Thompson, M.A., M.B., F.R.C.S. is an instructive and illuminating treatise for achieving quickly the object of a student thrown at large on the British Isles, without anyone to chalk out a programme. Every student of medicine ought to feel grateful for the book and possess one for himself. It is ernestly hoped that more books of this nature, on M.R.C.P. Edinburgh and London, M.D. & M.S., of different Universities will written by those who have had experience of these examinations to inspire the untutored into right lines of study.

Current Medical Literature.

Bacteriology.

Chronic Ulcerative Colitis.

Hurst is of opinion that chronic ulcerative colitis is due to B. Dysenteriae, but Dukes dismisses this view on the grounds of almost universally negative bacteriological and epidemiological evidence, the absence of agglutination and the uncertain effect of antidysenteric serum. It is now attributed to be due to a Gram positive diplo-streptococcus and a vaccine of this organism is of immense therapeutic value. The proper method of collecting the material for the vaccine is to wash the bowel well, to introduce a proctroscope so as to have a good view of the ulcers, and to collect the material from the base of the ulcers by means of a sterile swab—*Practitioner, August 1931.*

Intradermal Method of Active Immunisation against Typhoid Fever.

The administration at 5 to 7 day intervals of four doses of a freshly prepared (not more than 2 months old) triple typhoid vaccine containing one billion typhoid organisms of known potency and 500 milllon each of paratyphoid A and B, and given by intradermal injection into the upper arm, the first dose being ·05 c c, the second and third doses 0·15 c.c. and the fourth 0·2 c.c. is described as a method of active immunisation against Typhoid Fever. The small dosage used, the ease of performance, and the complete absence of the constitutional reactions are claimed to be the advantages. *Tuft and Louis—The Journal of Laboratory and Clinical Medicine March 1931.*

G. V. S.

Pharmacology.

"The Spermicidal Power of Chemical Contraceptives. (Pure substances)"

J. R. Baker. Journal of Hygiene, Vol. XXXI, 2, 1st April, 1931.

Of 36 substances tested, Mercuric Chloride and Formaldehyde were found to be the most powerful spermicidal substances, the killing concentration being 1/256 per cent. Hexyl Resorcinol kills at 1/64 per cent and soaps at 1/32 per cent. Quinine bisulphate and Chinosol, which are perhaps more commonly used as contraceptives than any other substances, only kill at

½ per cent. Certain very poisonous substances like potassium cyanide, prussic acid and strychine hydrochloride have very slight spermicidal effects. Foaming mixtures consisting of acids and sodium bicarbonate, could probably be used alone as contraceptives Sperms are very susceptible to changes in osmotic pressure, and substances which reduce surface tension are often effective spemicides.

"The Spermicidal Powers of Chemical Contraceptives (Pessaries)

J. R. Baker Journal of Hygiene. Vol. XXXI, 2, 1st July 1931.

Those pessaries which do not contain cocoa-butter are more spermicidal than those that do. Quinine and lactic acid pessaries in cocoa-butter vehicles, are almost without effect on sperms. There is more than ten times as much quinine in a quinine pessary as suffices to kill all sperms in half an hour, but the cocoa-butter pervents its action in some way which is not at present understood. *Semroi* which is a foaming tablet consisting of dioxyquinolin sulphate, potassium borotartrate, sodium bicarbonate and tartaric acid, is the most spermicidal pessary of the nine investigated. Even at one-tenth of the concentration at which it is normally used, it kills every sperm or nearly every sperm in half an hour. Even if the foam producing substances are omitted, *Semori* remains effective. The minute quinine urea hydrochloride pessary is nearly as effective as *Semori*, but the absence of foam producing substances in this pessary limits its usefulness. *Speton* relies for its spermicidal power wholly on its foam producing substances. Its supposedly active substance, Sodium dichlorylsulphamid-benzoate, is without effect on sperms.

J. C. D.

Therapeutics

Tuberculosis of the Larynx.

J. Dundas Grant in "The Practitioner" August 1931.

The diagnosis of tuberculosis of the larynx is based on (1) The occurrence of persistent and increasing hoarseness or pain in swallowing, in a person suffering from pulmonary tuberculosis. This pain is due to infiltration and ulceration of the outer surfaces of the epiglottis or ary epiglottic folds. (2) The symptoms of Intrinsic tuberculosis of the larynx are chiefly disturbance of voice, cough and occasionally obstructed respiration; in extrinsic forms, pain, most marked during swallowing. (3) The examination of the sputum for T. B. If there be difficulty in obtaining sputum, the following methods may be employed: (*a*) by means of "coaxing" the patient to "shoot the sputum into the bowl" while the head is kept down over it with the mouth wide open, (*b*) making the patient sniff the vapour of Oleum

Sinapis Volatile, from the neck of a six ounce bottle in which there is half an ounce of oil at the bottom, (*c*) by intra-laryngeal injection by a laryngeal syringe of a few drops of a weak solution of Soda Bicarb to which a little hydrogen peroxide is added. If intra-laryngeal injection is not possible, intra-nasal instillation by asking the patient (with his mouth wide open and head thrown back) to "pant in and out" through his mouth and not to swallow and at the same time to syringe about half a drachm of the solution drop by drop through the nose. A small quantity enters the larynx and sets up a cough with expectoration of sputum, (*d*) the administration of Pot. Iodide in a few cases. (4) General wasting of muscles (exclude cancer). (5) Regurgitation of fluids into the larynx and trachea during drinking, in a person suffering from Pulmonary Tuberculosis. (6) Laryngoscopic examination and cutting a section of the growth for examination.

Treatment.—(1) Complete silence, wherever possible; where this is not possible owing to the temperament of the individual, modified silence, *i.e.*, talking only in a *silent* whisper.

(2) Wearning of a respirator (Burney's Yeo's) charged with the following solution "Guttae Cinnamomi Co".

Ol. Cinnamomi }
Ol. Citronelli } each 12 minims.

Ol. Pin. Sylvest }
Sp. Chloroform } each 1½ drachms.

Creosote 3 drachms.

(3) The nose should be cleared of catarrhal and purulent secretions by means of a sniffing nasal douche using the following solution:

Sod. Salicyl }
Sod. Chloride } each Gr. 48.

Sod. Bicarbonate Gr. 96

Glycerine m. 72.

Aqua Menthol.

(made like aqua camphor.) ad. 2 ounces.

(4) A "useful" cough, *i.e.*, one which brings out sputum should be encouraged, but a dry cough is to be suppressed.

(5) Intra-nasal insufflation of 1 in 20 solution of Eucalyptol in oil of sweet almonds.

(6) For relief of pain in swallowing the application a galvanocautery to the ulcerated area, using a laryngoscope; inhalation of a local anaesthetic such as anaesthesin and orthoform equal parts in the form of a powder by means of Leduc's tube.

If the powder is irritating, the following emulsion may be used.—

Menthol 24 grs.

Pulv. Gum. acacia }
Old. amygdal } each 2½ drachms.
Aqua Distil. }

Ft. Emulsio et adde:
Anaesthesin 1½ drachms.
Sp. Vini Rect. 10 drachms.
Aqua distil. 2 ozs.
Mix and shake well.

Failing the above, blocking the superior laryngeal nerve with 1 c. c. of a solution consisting of 2 grains of hydrochloride of eucaine in 1 ounce of 80 per cent alcohol will be effective.

(7) For regurgitation of liquids during drinking, the "Wolfenden's method" might be employed. The patient lies on his face, lowers his head over the side of the bed or foot of the couch and drinks from a cup through an india rubber tube.

(8) Other institutional treatment such as nourishing food, fresh air, etc., must be carried out in addition.

M. N. P.

A New Indian Drug for Insanity and High Blood Pressure.

Gananath Sen and Kartick Chandra Bose (Indian Medical World, July 1931) describe the pharmacology and therapeutics of a drug, Rawolfia Serpentina, which is available in Bengal, Behar and United Provinces. The pharmacological study of the drug was conducted in Dr. Bose's Laboratory.

It contains an alkaloid, resin and salts such as Potassium Carbonate, Phosphate and Silicate and traces of iron and manganese. Very little alkaloid is extracted with water on boiling; only some portions of the resins are obtained. By maceration with cold rectified spirit, only 0 7 per cent of the alkaloid is obtained. The alkaloid is almost insoluble in dry ether. Repeated hot extractions of the drug with chloroform completely exhausted the drug of its alkaloids, the alkaloid constituting about 1 per cent of the whole drug.

Medicine.

Hunger Pain in Pyloric and Duodenal Ulcer.

(*British Medical Journal, 15th August 1931.*)

The " Pyloric syndrome " *i.e.*, periodic occurrence of epigastric pain and vomiting some time after a meal, together with hypersecretion of gastric juice, and often with retention of gastric contents (" hunger pains ") was described by Moynihan as indicative of duodenal ulcer. This group of symptoms was later established by Faber as characteric of juxta pyloric ulcers on both sides of the pylorus; differentiating them from ulcers of the body of the stomach.

It is now claimed that these symptoms are due to a pyloric gastritis rather than to an ulceration. Dr. Olive Christensen in a recent series of experiments (employing a sausage shaped balloon introduced into the stomach and inflated, and a manometer attached) has shown that in patients with duodenal ulcer, there is a distinct connection between the hunger pains and the hunger contraction periods of the stomach. The pains were never present without a gastro-graphic curve showing a concurrent contraction period and no registration of an attack of pains was made during a period of absolute rest in the stomach movements. The hunger pains would always begin sooner or later after a contraction period had started, and would cease when this period was replaced by absolute rest or a few minutes after. When the pains are relieved by intake of food, it is owing to the vigorous contractions being replaced by periods of gentle slow contractions or relative rest. Hunger pains, however, cannot be regarded as depending entirely on motor conditions. There was no relation between the spontaneous or induced variations in the acidity of the stomach contents and the appearance or the intensity of the pain. The apparent relief of the hunger pains by Soda Bicarb is more likely due to the filling effect of the stomach by the carbon dioxide produced. Dr. Christensen has found that patients treated for gastric ulcer often showed a higher acidity in a test meal after a cure of symptoms, rather than when the treatment was begun.

It is concluded, therefore, that the appearance and intensity of hunger pains has no relation to the acidity of the stomach contents but that hunger pains are a symptom of pyloric gastritis and that the seasonal occurrence of the pain may be associated with exacerbation and improvement of the gastritis.

M. N. P.

The Causation of Chronic Gastroduodenal Ulcers.

(*The Clinical Journal, 12th August 1931.*)

J. Jacques Spira has written a book on the above subject with an introduction by Sir Humphrey Rolleston. His theory is that a food factor—fats—causes the preliminary chronic congestion of the pyloric end of the stomach and the first part of the duodenum, and that this congestion facilitates the formation of a chronic ulcer by the hydrochloric acid of the stomach, specially when in excess. The symptoms of the pre-ulcer congestion and of the ulcer itself are often identical. Fats, he says, when introduced into the stomach regularly cause regurgitation of the duodenal contents, including bile; bile salts plus the acid gastric contents damage the mucous membrane of the stomach. Fat inhibits gastric movements, delays digestion, and though containing necessary vitamins, is necessary only in small amounts. This food foctor accounts for its familial, seasonal and geographical incidence and points the way to correct treatment. His method is simple and easy to carry out and apparently gives good results. Fats are diminished and small doses of alkali given. His plan, he states, in unirritating to the gastric mucosa, promotes rapid evacuation of the stomach, excites little secretion, removes the hydrochloric digestion of the mucous membrane and fights the infection. His arguments are well worth consideration and his treatment seems worth testing.

M. N. P.

Malignant Nephrosclerosis.

The August number of " Archieves of Internal Medicine " contains a very interesting article on the pathogenesis of malignant nephrosclerosis by Phillip F. Shepiro. Nephrosclerosis is the essential renal lesion in primary arterial hypertension and in most cases the nephrosclerosis is in itself benign. The chronic hypertension terminates in cardiac insufficiency in a cerebrovascular accident, in a coronary accident or through some incidental cause. In the remaining cases, the nephrosclerosis itself is the malignant, lethal fator and the hypertensive state is closed by uraemia.

In most cases the clinical and morphologic distinction between benign and malignant nephrosclerosis is sharp and so striking are the morphological differences, that various observers have postulated an altogether different etiology and pathogenesis for the malignant form. The writer reviews the various theories advanced as to the etiology and pathogenesis of malignant nephrosclerosis and remarks that in this argument the questions of etiology had not been sufficiently separated from those of pathogenesis. Nothing

definite is as yet known about the etiology of either the benign or the malignant forms. Only their respective pathogenesis could be studied and compared and it is better to avoid questions of etiology until something more definite is known.

The writer maintains there is no fundamental difference in the patho genesis of benign and malignant nephrosclerosis whatever their respective etiologies may be. Nephrosclerosis is undeniably associated with ischæmia. But ischæmia as such is not the basis for the characteristic pathologic changes. These changes are intimately and proportionately associated not with ischæmia but with a direct hyperæmia. A given portion of the vascular tree at any one time contained a greater quantity of blood but the blood was passing through these vessels more slowly than before. What really occurred was a hyperæmia with retardation. Gustav Ricker was the first to explain the paradox encountered in these conditions: namely an hyperæmia associated with ischæmia. According to his views, the arteries, arterioles and capillaries are innervated organs with a double nerve supply regulating constriction and stimulation. Moderate stimuli produce moderate contraction; strong stimuli produced marked contraction; excessive stimuli produce a loss of constrictor tonus with paralysis and therefore excessive stimuli result quickly not in contraction but in dilatation. The arterial tree reacts segmentally. Its peripheral portions are progressively more sensitive than the proximal portions. A stimulus that is sufficiently strong to cause marked contraction of a larger artery constitutes an excessive stimulus to the capillaries and arterioles and results in their dilatation. This dissociation in reaction between arterial contraction and peripheral dilatation is not always uniform. But whenever and wherever it occurs, there is marked decrease in the velocity of blood through the involved dilated, peripheral bed. The greater the peripheral dilatation, the greater will be the retardation. Only by an exaggeration of this normal, neurogenic, vascular mechanism do organic pathological changes follow.

In benign nephrosclerosis the dissociation in reaction between arterial contraction and peripheral dilatation is moderate. The retardation, the nutritional inpairment and consequent changes are slight, and drawn out over a long period. This induces a hyperplastic intimal thickening of the arteries and arterioles and a gradual hyalinisation and atrophy of the glomeruli. In malignant nephrosclerosis, the dissociation is marked and the dilatations are extreme, almost approaching to complete stasis. The nutrient supply is markedly reduced in the dilated vessels, and severe changes rapidly result. First a loose intimal swelling with cellular proliferation degeneration occurs; as stasis sets in proliferation stops and severe fatty and hyaline and finally necrosis results.

In benign nephrosclerosis the process is moderate but focal so that most of the kidney is still left to carry on renal function. In malignant nephrosclerosis, the process is focal and irregular but so severe is the vascular upset that renal function is stopped and necrotic lesions appear. So rapid is the onslaught that cases are rarely found in transitional stages before the condition has led to death from uncomplicated uraemia.

P. K.

Achlorhydria and Anaemia.

Since the discovery of achlorhydria as the most decisive differential sign in establishing the diagnosis of pernicious anaemia much interest has been roused in the study of the relation of achlorhydria to anaemia. Two articles of more than passing interest appear in current medical literature—one in the August number of the Archieves of Internal Medicine and the other in the July number of the Quarterly Journal of Medicine.

I

"The Relation of Achlorhydria to Pernicious Anaemia."

Achlorhydria is the most constant symptom of pernicious anaemia. The view of Hunter that the achlorhydria is to be regarded as secondary and consequent to gastro intestinal sepsis of unknown origin is no longer tenable for the following reasons:—

1. If achlorhydria were secondary one should expect occasionally in the course of development of anaemia to witness the general diminution of hydrochloric acid from normal to sub-acidity and finally no achlorhydria But such a diminution has not been noted. At the first examination. achlorhydria is invariably present.

2. The acid never appears, no matter how long the remission.

3. Achlorhydria precedes the development of pernicious anaemia for periods varying from 4 to 25 years.

Since achlorhydria often precedes pernicious anaemia by a number of decades, the question arises whether achlorhydria and the consquent anaemia are congenital and transmissible and therefore familial characteristics. Achlorhydria is often present in certain families. In families in which a case of pernicious anaemia has occured, the incidence of achlorhydria is, much higher than normal, as this incidence increases in each decade and as achlorhydria is exceptional in childhood, achlorhydria itself is not transmitted but only the tendency thereto. Pernicious anaemia is frequently hereditary and familial. Whether pernicious anaemia is always hereditary and whether it is a dominant or recessive character and transmissible according to the Mendelian law cannot be determined until such families are studied with

particular reference to achlorhydria and with accurate haematologic examinations being made for three generations at least.

Achlorhydria occurs not only in pernicious anaemia but also in connection with certain other conditions, notably with Bothriocephalus Latus infection, artificial achlorhydria, pregnancy, sprue and also in association with secondary or chlorotic types of anaemia. The writer next describes the relationship of achlorhydria to these conditions. The haematologic and clinical picture of pernicious anaemia and that of Bothriocephalus anaemia are identical, even in respect of achlorhydria. Is the achlorhydria the result or does it precede the infection like pernicious anaemia? Bothriocephalus anaemia shows a strong familial tendency. Achlorhydria is always found in this condition and the achlorhydria persisted after the expulsion of the worm. Only a small percentage of patients infested with Bothriocephalus developed anaemia. Could it be that only those patients with achlorhydria acquire pernicious anaemia after infection with Bothriocephalus? It is doubtful whether Bothriocephalus has anything to do with the development of pernicious anaemia. The writer then gives the reasons for this doubt. He concludes that so far as the facts allow, one may justifiably say that it is not proved that Bothriocephalus is the origin of pernicious anaemia.

The development of pernicious anaemia after an acquired achlorhydria (*e.g.* complete gastric resection) has not definitely been proved. There is no reason why a common disease like pernicious anaemia should not be associated with maladies so common as gastric carcinoma or gastric ulcer in the treatment of which complete gastrectomies are done resulting in artificial achlorhydria.

Many of the so called severe anaemias of pregnancy, those not due to haemorrhage or sepsis, represent cases of true pernicious anaemia in which the patients have become pregnant. Whether the pregnancy is the exciting factor in patients with a constitutional tendency remains to be proved. The typical haematological picture:—achlorhydria, glossitis, cord changes of pernicious anaemia, often occurs in sprue. With regard to the relation of achlorhydria to the anaemia of sprue our knowledge is deficient. The following data are necessary to determine this relationship. Does achlorhydria develop in sprue or is it a precursor of the disease? Does anaemia occur in sprue only in the cases in which achlorhydria is present? In rare cases in which recovery occurs, does the achlorhydria return? Why is it that liver therapy as a rule is unsuccessful in the treatment of the anaemia of sprue? The writer thinks the probable reason for this is that the anaemia of sprue and of Pernicious anaemia are entirely separate diseases and that one does not pass into the other, no matter how close the clinical resemblance may be.

There is a definite relation between achlorhydria and anaemia, of the pernicious, secondary and chlorotic types. The blood of relatives of patients with pernicious anaemia shows changes which sometimes may be regarded as the earliest or preclinical evidence of the disease.

Finally the writer discusses the mechanism of achlorhydria on Erthyropoesis. Achlorhydria alone is not responsible for Erthyropoesis as hydrochloric acid is useless in the treatment of Pernicious anaemia. Castle showed that the incubation of normal gastric juice with beef muscle produced a substance that brought about a remission in patients with pernicious anaemia precisely comparable to that produced by liver therapy. Neither hydrochloric acid alone nor the beef muscle alone or both administered separately had any effect on the disease. Castle's work suggests that some unknown substance in normal gastric secretion might be the erythropoitic factor. The writer concludes with the remark that it would be hazardous at present to venture any theory as to the cause of Pernicious anaemia; all that one can say at present is that Pernicious anaemia is partly the result of a deficiency and partly of a defective gastric hormone, of which achlorhydria is the most tangible symptom.

P. K.

II

Studies in Achlorhydria and Anaemia.

In the second article entitled "Studies in achlorhydria and anaemia," Daniel T. Davies discusses the variations found in the gastric juice in the various types of anaemia and their significane. He considers that the ordinary fractional test meal is not sufficient for this purpose as the introduction of a diluent in the form of gruel masks the changes in the gastric juice. He uses subcutaneous injections of histamine. The juice is aspirated in the fasting state 10 and 20 minutes after the injection. The following things were noted with regard to the juice: volume, appearance, mucus, deposit, ph., Hcl. and pepsin. 45 patients were investigated in this way and all the patients were known to have achlorhydira. These included cases of achlorhydria with pernicious anaemia, achlorhydria with secondary anaemia, and achlorhydria but no anaemia. A comparative study of these results with the results obtained from normal patients revealed the fact that between normal gastric secretion and achylia there are various stages in which the gastric secretion fails with regard to one or more of its constituents. The writer gives the following table giving the stages in failing secretion:—

Normal Juice. Clear, mucus slight; No deposit; Hcl+ Pepsin+ after histamine—increase in volume, in Hcl and in Pepsin.

1st Stage. Clear; mucus++; no deposit; Hcl diminished; Pepsin.+ after histamine—increase in volume, in Hcl and in Pepsin.

2nd Stage. Gastric secretion in secondry anaemia (1) clear; mucus ++++no deposit; Hcl absent; Pepsin diminished; after histamine increase in volume slight, increase in Hcl and Pepsin.

3rd Stage. Gastric secretion in secondary anaemia (2) cloudy; mucus+; slight deposit (in resting juice); Hcl absent; Pepsin absent; after histamine —little increase in volume. No Hcl. Pepsin increased.

4th Stage and final stage. Gastric secretion in pernicious anaemia. Cloudy; mucus nil; Deposit++++. Hcl absent; Pepsin absent; after histamine—No increase in volume; No Hcl; No pepsin; ph. constant.

The writer then discusses the relation of the two types of anaemia to their gastric secretion and correlates the clinical features with the changes in secretion.

Secondary anaemia with achlorhydria. Attention has been drawn to the secondary anaemia which occurs in certain cases of achlorhydria. Witts calls this syndrome simple achlorhydric anaemia. It occurs mostly in women between the ages 35 to 50. Chief symptoms are morning nausea, flatulence and a sense of fullness after food. Appetite unstable. Diet deficient in proteins. Dyspnoea and palpitations common. The lips are often fissured. Changes in the tongue mucosa common. Spleen is often palpable. No excess of bile pigments appears in blood serum and uro-bilin is absent from the urine. Dystrophic changes in nails common. The anaemia is not the direct consequence of loss of blood; cord symptoms not uncommon. Constipation more common than diarrhoea. Colour index below 1. Red cells normal in size or variations towards the small size. W.B.C. normal in count or a leucopenia. The main deficiency seems to be in the hæmoglobin content. This low hæmoglobin content may result from a failure of iron absorption or intake. In these patients there is defective intake of iron and abnormal gastric secretion. These cases improve with iron administration but this improvement is maintained only with continuous dosages as there is a lack of absorption here.

Pernicious anaemia and achlorhydria. Here the derangement in gastric secretion is the most advanced that can be met with. It is permanent and generally results in a complete absence of Pepsin. It is suggested that the "intrinsic factor of Castle" must be a product of gastric secretion which fails in the majority of cases when and as Pepsin fails. Those few patients who secreted some ferment required less liver dosage than those who had no pepsin in their secretion after stimulation. The deposit of squamous cells obtained in the gastric secretion of cases of primary anaemia signifies the complete inability of that secretion to digest the cells that normally are shed from the oesophagus and are carried down into the stomach.

P. K.

Correspondence.

To

THE EDITOR,

THE MADRAS MEDICAL JOURNAL.

SIR,

With regard to the short article of Dr. N. S. Narasimhan on "Some Observations on Filariasis" which appeared in your July issue, may I point out that he has given no detailed information of the cases nor his observations on each individual case? He says his leucocyte counts of cases of lymphangitis and orchitis were always between 9,000 and 12,000. I suggest that his detailed observations in these cases will be of more value than the inferences he has published about their streptococal origin.

Yours faithfully,

(Sd.) T. BHASKARA MENON,

Dept. of Pathology,

MEDICAL COLLEGE, MADRAS,

24th September 1931.

To

THE EDITOR,

THE MADRAS MEDICAL JOURNAL.

SIR,

With reference to the article "Therapeutics of Goat's Blood" appearing in the July 1931 issue of your Journal I would like to make a few observations:

According to " A system of Bacteriology " published by the Medical Research Council of England, 1930 edition, " tuberculosis amongst goats, though rare in England is relatively frequent on the continent. Tuberculosis in the goat is usually generalised and involves the lungs more severely than other organs. The pulmonary lesions tend to break down and form cavities. Mammary tuberculosis is not uncommon and in such circumstances the milk may be a source of infection to human beings." It would be interesting to know the view of other workers in India on this subject.

I wish to know if Dr. Dhairyam has treated further cases with goat's blood; if so, the clinical details and effects of the treatment might be published; and also whether the cases have been followed up after their discharge from hospital; the treatment requires further trial, for, if it is really beneficial in cases of tuberculous meningitis, arthritis, lupus and pulmonary tuberculosis, even a village practitioner without any costly apparatus or drugs might carry out the treatment.

I am,

Yours faithfully,

M. NARAYANA RAI,

Dept. of Pathology.

MEDICAL COLLEGE, MADRAS,
28th September 1931.

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MEDICAL COLLEGE, MADRAS,
10th November 1931.

FROM

LIEUT.-COL. C. A. F. HINGSTON, C.I.E., O.B.E., V.H.S., I.M.S.,
Principal.

TO

THE EDITOR,
MADRAS MEDICAL JOURNAL.

SIR,

Kindly publish the enclosed appeal regarding Dame Scharlieb Memorial in your journal.

C. A. F. HINGSTON, LIEUT.-COL., I.M.S.,
Principal,
MEDICAL COLLEGE, MADRAS.
3rd February 1931.

TO

ALL THE MEDICAL MEN WHO HAVE PASSED OUT OF THE MEDICAL COLLEGE, MADRAS.

SIR,

The Principal, Medical College, Madras, proposes to have a memorial put up in the College, to the late Dame Scharlieb, who was one of the most distinguished students who have passed out of this College, He feels sure that medical men who passed out of this College will be willing to subscribe to this memorial. It has been suggested that a painting of the late Dame Scharlieb would be a suitable memorial to put up, and it is proposed to do this if the subscription amounts to about Rs. 1,000. If this is not possible, it is proposed to put up a brass plate.

Would you kindly send to the Principal, Medical College, Madras, any subscription you are willing to give. It will be duly acknowledged and the list of subscriptions will be published in the College Magazine.

If a painting is decided on, arrangements will be made to have it done in London if possible, by a good artist.

Yours faithfully,

C. A. F. HINGSTON, LIEUT.-COL., I.M.S.,
Principal,

Association Notes.

An emergent meeting of the Association was held on 5th August 1931 to consider the question of retrenchment. Over 50 city members were present.

Several of the members gave out in what all possible ways retrenchment could be effected. All were unanimous that junior officers of the service should not be sent out.

In the end the Association decided to submit a memorandum and also to request the Surgeon-General to allow the Association to wait on him in a deputation. Seven members were elected to form the deputation and the President was requested to submit the memorandum the next day.

A memorandum to the Surgeon-General was submitted on 6th August 1931 and the deputation waited on the Surgeon-General the next day.

An ordinary clinical meeting of the Association was held at the General Hospital on Saturday the 15th August 1931.

Dr. P. Kutumbiah, Dr. R. Viswanathan, and Dr. K. S. Sanjivi, demonstrated a few interesting cases.

A clinical meeting of the Association was held on Wednesday the 30th September 1931 at the Mental Hospital.

Dr. G. R. Parasuram demonstrated some interesting cases over which a discussion followed.

An Executive Committee meeting of the Association was held on Monday the 12th October 1931 to discuss the Draft All-India Medical Council Bill.

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