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A JOURNAL OF MEDICINE IN ALL ITS BRANCHES.

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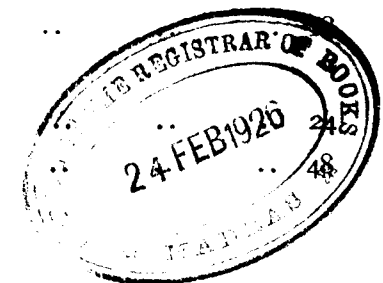
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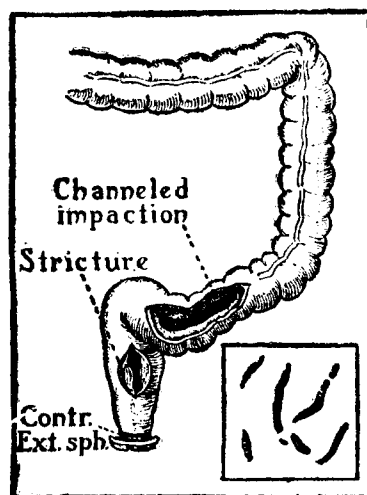
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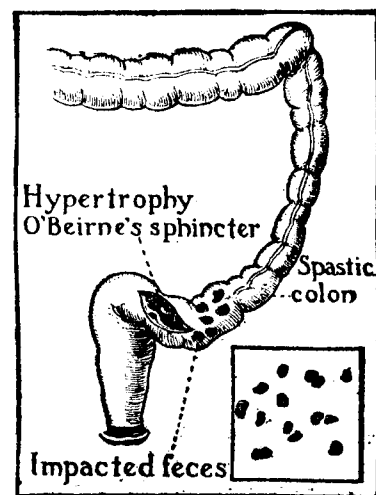
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THE MADRAS MEDICAL JOURNAL.

NOVEMBER 1925.

ORIGINAL ARTICLES.

A FEW FACTS IN THERAPEUTIC INOCULATION.

[BY DR. S. RAMAKRISHNAN, L.R.C. P. & S. (EDN.).

King Institute, Guindy.]

When vaccines in appropriate doses are added to the blood, whether in vivo or in vitro, a positive phase or as it may be better called, an epiphylactic or immunising effect may be registered in less than 24 hours after the incorporation of a vaccine. The epiphylactic response here in question consists in an extrusion of bactericidal elements from the leucocytes and it is mainly through this that the bactericidal action of the leucocytes is exerted. The anti-bacterial substances elaborated in response to inoculation, operate specifically upon the variety of microbe which has furnished the vaccine, but it is possible that in addition some collateral immunisation is achieved. Thus it follows that while the nature of the infecting microbe should in every case be ascertained, it is not theoretically necessary that the vaccine employed in treatment or arrest of infection, should be derived from the species of microbe which causes the disease. Sufficient justification for response to a particular vaccine is afforded when that vaccine has been shown to increase the anti-bacterial substances which operate upon the infecting microbe.

In septicæmias and other heavy bacterial infections the patient's leucocytes lose their power of responding to vaccines. In such cases it is essential before inoculating,

to satisfy oneself that the patient's blood still retains its power of epiphyllactic response.

How to measure the bactericidal power of blood.—To implant graduated quanta of microbes into blood, to introduce the implanted blood into *slide-cell*, to incubate so as to let such microbes as have survived grow out into colonies.

Slide cells.—These are made from ordinary microscopic slides. A large proportion of slides are not flat. If we catch them between the thumb and middle finger and try to twirl them we shall find that they refuse to spin on one face while they spin round easily upon the other. We thus learn that one face of the slide is concave and the other convex. We take a suitable sterilised slide, place it with the convex side turned uppermost on a bench, and provide confining walls for four compartments by taking strips of paper dipped in very hot vaseline, and laying these down at both ends and at equal intermediate distances along the slide. We then take another slide, hold it over the flame concave side downwards and then immediately press it down upon the vaseline strips. The paper employed for these strips must be of a standard thickness so as to give blood films of appropriate and uniform depth. If the blood film is too thick the growing colonies are concealed and if too thin the leucocytes are too far apart from the implanted microbe. A convenient depth is obtained by using strips of paper one-twelfth of a millimeter thick.

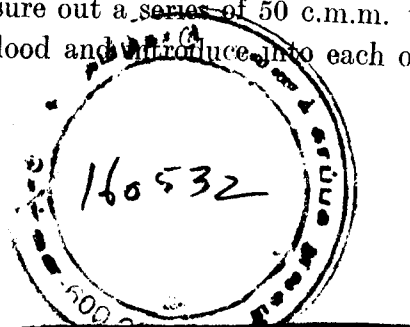
Details of procedure.—We begin by making a series of progressive dilutions of our bacterial culture. Then, we measure out a series of 50 c.m.m. volumes of defibrinated blood and introduce into each of these 2.5 c.m.m.

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of one of the dilutions of our culture. After thorough mixing we introduce the implanted blood into one of the compartments of our slide-cell. In doing this, the edges of the slide-cell are re-sterilised by passing them through the flame and the upper slide is pushed back a little, so as to leave a projecting lower lip upon which to rest the point of the pipette which carried the blood. When the compartments have been filled in, the upper slide is brought back into position and the ends and sides are carefully sealed by brushing them over with very hot melted paraffin. After 24 hours' incubation, the staphylococcus colonies show up against the scarlet background as dark purple discolorations.

For the scientific treatment of any grave infection, one requires specific information with regard to the patient's condition. We require to know how he stands in the matter of the anti-bacterial power of his blood and with regard to his capacity for making immunising response to vaccines. Here the slide-cell in-culturing procedure helps us. The following examples give an idea of what can be learnt from the slide-cell procedure:—

No. of colonies which developed in	No. of Staph. colonies implanted respectively in volume.		
	1000	500	250
Patient's blood ..	182	88	43
Control ..	81	36	10
Patient's blood ..	120	51	22
Control ..	20	8	3



In heavy bacterial infection the immunising response is very low. The leucocytes are chiefly at fault. Although in respect of numbers they are not usually deficient, yet in respect of bactericidal functions they are often far below the normal. They fail to furnish protective substances, *i.e.*, to make an immunising response. When brought in contact with microbes outside the body, their phagocytic power and their power of killing microbes extracellularly are also reduced. It is not surprising that patients whose blood show such defects should, if left to themselves, go from bad to worse. The infecting bacteria multiply and produce toxic substances while the leucocytes poisoned by these toxic substances are unable to function as they should. In such circumstances it is manifestly useless to treat patients with vaccine—he is unable to respond to it. We may, however, sometimes be able to turn the scale in his favour if we can confer a temporary passive immunity by means of the bactericidal plasma we inject and so furnish him with a large body of normal leucocytes capable of making an active immunising response. This is what we seek to do by immuno-transfusion. Herein, I set out the skeleton of what is being done in the way of treatment by immuno-transfusion in St. Mary's Hospital.

1. Tests which enable us to determine whether an individual ought to be treated by inoculation of vaccine or by I. T.
2. Choice of a donor.
3. Inoculation of donor's blood.
4. Considerations which make us elect to use defibrinated blood.

5. Procedure for drawing off the blood from the donor and defibrinating it.

6. Procedure for injecting the blood into patient.

In view of what has already been said, it will be clear that what we want to know most about every patient who is suffering from a heavy bacterial infection and is not doing well, is whether his leucocytes are capable of making an immunising response. For the purpose of evaluating the phagocytic power of the patient's blood all we require to do, is to obtain small samples of blood from the patients and from a normal individual (2 or 3 drops on the finger will do), defibrinate each of them and then put up phagocytic mixtures consisting of—

(a) Two volumes of patient's blood *plus* one volume of staph-emulsion.

(b) Two volumes of normal blood *plus* one volume of the same emulsion.

After incubation of these mixtures for 15 or 20 minutes the phagocytic intake occurring in each is counted in the usual manner. When a very low phagocytic count is obtained with the patient's blood—say one-third or less of that obtained with the normal blood—it is due to the diminished activity of the leucocytes. It is therefore assumed that where the phagocytic intake obtained with the patient's blood is a third or less of that obtained with the normal blood, the patient's leucocytes will be incapable of making satisfactory immunising response to injection of vaccines and that immuno-T is indicated. I. T. commends itself especially when all that the surgeon can do has been done. If a large abscess remains undrained, or if tissues are so extensively infected as to flood the blood stream continuously with

overwhelming doses of bacterial toxins, we cannot expect to save the patient by a vaccine or I. T. or by any other method.

(2) *Choice of a donor.*—The requirements of I. T. do not differ from those of a simple blood transfusion in this respect. For both purposes we employ a healthy individual free from syphilis, malaria or tubercle infection having first determined that his or her blood is compatible with that of the patient—that is to say, that his or her R. B. C. fail to agglutinate when mixed with the serum of the patient. To test this, we have only to obtain a very small drop of blood from the donor's finger, dilute it with three or four times its bulk of salt solution and mix with it a small drop of the patient's serum. If, after three or four minutes, the mixture still remains a homogeneous emulsion of corpuscles, we judge the donor's blood to be compatible with that of the patient's. If, however, circumstances prevent our thus matching the donor's blood directly against the patient's serum, we may either employ any donor whose blood conforms to the characters of group four—for the R. B. C. of this type of blood are not agglutinated by any normal serum, or where it is known that the patient's blood belongs to a particular group, we may seek for a donor whose blood is of that group. It has been found that febrile reactions are less commonly seen after the injection of blood from donor's of the same group as the patient's.

(3) The old idea that a patient suffering from a severe microbic infection, might derive benefit from the transfusion of blood taken from a patient who had recently recovered from a similar infection has been revived. Instead of taking the blood from the convalescent patient

it has been proposed to take it from a healthy donor, previously immunised by one or more inoculations of vaccines either from a vaccine prepared from the microbe infecting the patient or the homologous stock vaccine. The assumption is made that the blood of the donor is richly endowed with anti-bodies having a specific affinity for the microbe infecting the patient. But it has been recently found that the addition of an appropriate quantum of a certain vaccine to blood in vivo or in vitro, resulted in the elaboration of protective substances (as shown by increased bactericidal power) within a period of a few minutes to an hour. These protecting substances were derived from the leucocytes and were *non-specific* in character—that is, they were effective upon all the ordinary pathogenic microbes and not only upon that *one* species with which the blood has been vaccinated. It was this non-specific and rapidly evolved immunity which Sir Almoth Wright is producing for the purpose of immuno-transfusion with excellent results. The routine procedure is to inoculate donors subcutaneously with 1000 Millions of stock staphylo-vaccine and drawing blood after a period of 3 to 4 hours.

(4) The addition of sodium citrate or ammonium oxalate to normal blood in amounts sufficient to prevent clotting, considerably reduces its power to kill organisms by impairment of some of the functions of the leucocytes. In view of this reduction of its bactericidal efficiency, blood to which a decalcifying agent has been added, is not employed for I.T. Looking at the question from the stand-point of ease and convenience in carrying out the transfusion, our choice is no longer in doubt—we prefer to use defibrinated blood. By so doing we obviate all

difficulties which arise from the tendency of the unaltered blood to clot ; we avoid the dissecting out and the exposure of the veins of either donor or patient ; we do not require to have the donor in the immediate vicinity of the patient.

(5) *Apparatus required.*—A needle, about 2 feet of rubber tubing, and a short piece of glass tubing serve to conduct the blood from the donor's vein to the bottle. The latter is of about 1 litre capacity and is fitted with a rubber bung ; through the centre of the bung is passed a glass rod bent at its lower end in the form of a U which is intended to collect the fibrin clot during defibrination of the blood. The escape of air from the bottle is provided for, by a third hole through the bung. This is loosely plugged with cotton wool. Attention may be called to three points of detail :—

- 1) The bore of the needle should not be less than $1\frac{1}{2}$ m.m. With this size, it is possible to draw off 500 c.c. of blood in four to six minutes.
- (2) The glass tubing admitting blood into the bottle should not extend to more than one inch or two below the bung. In this position we can easily observe the rate of flow.
- (3) When the bottle and its contents are kept sterilised for use in an emergency, the needle is detached and sterilised independently.

Technique of bleeding.—It has never been found necessary to incise the skin and expose the vein. It is necessary to emphasise the importance of obtaining at the outset, the proper degree of venous congestion by the tourniquet and of maintaining this, so long as the blood is flowing by the

donor's muscular efforts. He should be instructed to close the fist tightly and relax again five or six times a minute.

Defibrination.—Commencing not later than $1\frac{1}{2}$ minutes after the blood first begins to flow into the bottle, we move the latter continuously in a rotatory fashion and fairly briskly until at least six minutes have elapsed after the needle is withdrawn from the vein. The fibrin clot in blood treated in this way, is found tightly adherent to the U tube. Its volume is about 20 c.cms. for 500 c.cms. of blood. The fluid blood retains practically all its red cells and 80 per cent. of its leucocytes.

Procedure for injecting the blood into the patient.—To drive the blood out of the bottle into the patient's vein a positive pressure is required. This is obtained by means of a syringe acting as a combined suction and force-pump. A record syringe is connected by means of a two-way tap with a thick walled rubber tubing and glass connection to which the blood is sucked up out of the bottle into the syringe (the intake tube) and 2nd thick walled rubber tube fitted with a needle (the delivery tube) through which the blood is driven from the syringe into the patient's vein. To these essential features are added one or two simple contrivances which ensure absolute safety. These are :—

(1) On the intake tube is incorporated a glass bulb loosely fitted with glass-wool—this is intended to catch any fragment of clot which might be free in the blood.

(2) On the delivery tube is incorporated another glass bulb which serves as an air trap.

(3) At the intake tube a second two-way tap is introduced giving connection to a bottle of sterile salt solution.

(4) A short piece of glass tubing inserted near the end of the delivery tube, to serve as a window.

AN INTERESTING ANATOMICAL ABNORMALITY.

(BY DR. U. VENKATARAYA NAYAK, M.B. & B.S.,
Assistant Professor of Anatomy Medical College, Madras.)

Absence of Parotid glands on both sides of the face.

I wish to bring up the account of the above-mentioned abnormality to the notice of the profession, because the physician or the surgeon does not usually expect to find the congenital absence of these large salivary glands on the sides of the face. It appeared particularly interesting to me and, I hope, will interest most of the readers of this journal for more reasons than one. In the first place the glands were absent on both sides of the face so that there was no chance of one gland becoming hypertrophied and taking on the functions of its missing fellow on the other side. Moreover, there was no increase in the size of the other large salivary glands about the face, *viz.*, the submaxillary and the sublingual glands which were formed to be of normal size on dissecting the submaxillary region of the neck. In the second place a reference to the standard text-books of Anatomy and Embryology showed that no such abnormality has hitherto been recorded. It is being recorded for the first time in the abnormality register of the Anatomical department of the Madras Medical College.

It was discovered in the body of a middle-aged male while the students were dissecting the side of the face.

The skin over the region of the Parotid was entire and showed no marks of any injury or operation. Attention was first drawn towards it by the absence of the Stensen's duct which usually takes an almost horizontal course across the side of the face a finger's breadth below the Zygoma with the transverse facial artery above it and the infra-orbital branches of the facial nerve below it. A few small lymphatic glands were seen lying in the superficial fascia over the region. When the deep fascia was removed a space was noticed which contained no gland but was filled with fatty areolar tissue, through which passed the various structures which usually traverse the substance of the Parotid, *viz.*, the facial nerve, the posterior facial vein and the external carotid artery. The facial nerve passed horizontally from the stylomastoid foramen towards the middle of the posterior border of the ramus of the mandible where it divided into its various branches. These entered the face by winding over the posterior border of the ramus and the zygomatic arch. The posterior facial vein was seen descending vertically behind it towards the angle of the mandible where it divided so as to form the external jugular and the common facial veins. The external carotid artery was seen ascending vertically behind and medial to the vein under cover of the posterior border of the ramus and in front of the styloid process and the muscles attached to it. It divided at the level of the neck of the mandible into its terminal divisions, *viz.*, the superficial temporal which entered the temporal region over the zygomatic arch and the internal maxillary which entered the zygomatic fossa behind the neck of the mandible. The course and relations of these structures through the Parotid space

clearly showed that the gland and duct were congenitally absent.

I showed the dissection to Dr. S. Swaminathan, L.R.C.P. & S. (Edin.), Professor of Anatomy, Madras Medical College, and he was also very much interested by it, being the first case in his wide experience. I have to thank him for his kind permission for the publication of the above notes.

CLINICAL NOTES.

IMPERFORATED HYMEN AND ITS COMPLICATIONS.

(Dr. A. N. VERGHESE, L.M.S., PALGHAT.)

The Hymen is a thin fold of mucus membrane situated at the orifice of the vagina. In a normal woman it is always perforate. This varies in shape; sometimes semi-lunar, more rarely cribriform but very often annular. Occasionally, it is absent entirely or may form a complete septum across the lower end of the vagina.

It is to illustrate the rare conditions I propose to give the following four cases that came to my notice during the last three years.

Case No. 1. A thick Hymen obstructing delivery.

A Brahmin woman named X, aged 21 years, the daughter of a retired officer, was in labour in one of the Aghahams of Palghat. The hospital midwife who was first called in, as the delivery was protracted, could not make out the presentation nor could she do a P. V. to her satisfaction. I was therefore sent for. On my arrival the midwife assured me that the membranes had ruptured but added that there was something very abnormal about the patient's vagina. She said she was

able to introduce her index finger into the vagina through an upper hole in a downward direction.

I should confess that it took me a few minutes before I was able to make out the condition.

The woman had small-pox of a mild type. In other respects she was quite a strong and healthy lady. There was no history of burns, scalds, or ulceration about the vagina.

With some difficulty I put my index finger through the slit in the upper part of the vagina and felt the presenting head. I also explored the inner surface of the offending septum and realised the cause of delay. The imperforate hymen, the cause of the delay, was quite thick and leathery to the feel. A good oval bit of it I cut off from the central portion. There was no appreciable bleeding. The rest of the matter was a simple forceps delivery of no events. The patient made an uninterrupted recovery.

In this instance, the hymen was a thick septum with a semilunar opening at the upper part, just below the urethra. The copulation was apparently through this hole. It is noteworthy, that no notice was taken of this condition till actually there was delay in the delivery. I am told her periods used to be normal and her condition caused no inconvenience.

Case No. 2. An abdominal tumour with severe periodical pains, emaciation and anaemia.

A young woman of the Chetty caste from Kollengod, aged 21 years, was admitted into the Municipal Hospital, Palghat, on 30—6—'23 for tumour in the lower abdomen with a history of Amenorrhœa for nearly six years. The girl was married but was not living with her husband.

She was a fully developed woman, quite healthy, in all other respects.

Examination revealed a tumour reaching a little above the umbilicus soft and partly movable. It was bulging out through the vagina. This bulging was made more prominent when the abdomen was pressed down. The entrance of the vagina was completely closed with a thick strong membrane—the hymen. One could easily feel through this vaginal bulging that the tumour was of fluid consistency.

She was put under chloroform. The central portion of the thick hymen was cut off and lateral incisions were made to enlarge the opening. Thick chocolate coloured dark brown fluid began to escape and the tumour disappeared. The fluid measured three pints 10 ozs.

According to the mother, who accompanied the patient, her daughter had menstruated once or twice but very sparingly. Apparently, this is either her imagination or a small untruth to make others believe her daughter was a normal person. There is a possibility that slight oozing of blood might have occurred and the anxious mother interpreted the same to be periods.

The patient was discharged, cured on the 8th day of the admission. Her uterus had contracted almost to the normal size at the time of the discharge. I understand she is having her normal periods and is keeping quite well and living with her husband.

Case No. 3. A young unmarried girl with distended lower abdomen with retention of urine and faecal matter.

A young Nair unmarried girl named _____, aged 17, was admitted for the above-said complaint on 5—6—'24 into the hospital. She was a normal girl of proportionate

developments for her age. She had not passed urine for two days and there was no motion for four days.

She was put on the table and urine was drawn. The condition was diagnosed as imperforate hymen. The usual operation was done and about two pints of fairly red and thick unclotted blood was withdrawn.

She was discharged after a purge on 11—6—'24 cured. She is perfectly well and is now married.

In this instance the hymen formed a complete septum at the mouth of the vagina.

Case No. 4. An abdominal tumour with severe periodical pains, emaciation and anaemia.

I have on hand a very interesting case to illustrate to what extent an imperforate hymen can do damage to a woman, particularly when the condition is neglected.

The patient is a Nair woman named _____, aged 23. Her husband is Mr. _____ Nair, aged about 32, a well built, fairly muscular, well-fed man. She belongs to a fairly respectable family in South Malabar.

Her mother believes that the daughter first menstruated in her fourteenth year, *i.e.*, 9 years ago, but admits that the flow was very scanty. The story goes that the unfortunate girl was delivered twice. This point I shall refer to more in detail subsequently.

The abdomen of the patient was rather tender. She did not allow an examination without chloroform. So the next day after admission she was put under chloroform and the examination and operation were completed the same day.

The abdomen was big and the tumour was reaching up to about three inches below the ensiform cartilage. On pressing the tumour vagina bulged out. It was an

oval tumour not easily moveable. The vagina showed no opening except that of the urethra which admitted my thumb easily. The urethra was very short and its direction was upwards and slightly backwards. I could feel the inside of her bladder with the index finger and explore the same as far as the finger could reach.

It must be mentioned here that the lady and the man were living as husband and wife for the past few years. The urethra must have gradually widened. The copulation was through this hole into the bladder. Apparently this must have been going on for about five years.

The woman has fully developed female organs. Her nipples are black and the areola pigmented black. A thin serous fluid was pressed out of the nipple. She is of medium height and build and of fair complexion. Her state of health on admission was bad. She looked weak, anæmic and rather emaciated. She wore an anxious look. Apparently, the frequent pains had played havoc on her constitution. Her relations stated that the agony of the pains especially for the past six months was so great that they were afraid she would commit suicide. To make the diagnosis more definite I put in a needle through the vaginal bulging and extracted dark blood. Then the hymen was cut open crucially. Thick, chocolate coloured blood began to escape in large quantities. The hymen was the thickest I saw. It was nearly one-eighth of an inch thick. The blood measured 4 pints 3 ozs.

The uterus was then explored. The major portion of a Boudins' tube easily went in. The size of the uterine cavity was nine inches. The vagina was a big hollow. The mouth of the uterus was widely dilated and there

was no os. The uterine wall was thinned out like paper. The uterus showed no signs of contraction. The evacuation of the contents, hot saline and lysol intra uterine douche, and an injection of pituitrin did not produce the least effect on the stretched-out muscles of the uterus. The patient was sent back to bed hoping against hope that time will help the regeneration and contraction of the uterine muscles.

The patient is still in the hospital. There are no appreciable signs of contraction. On the fifth day of the operation she developed slight sepsis which went on to a mild condition of septic peritonitis. Just as she was getting better of this she developed pneumonia. Her condition is fairly satisfactory, and I believe she is out of danger.

The question still remains how to deal with her uterus. A hysterectomy shall have to be decided on later when she improves sufficiently to stand such an operation.

I have now to give the details of the so-called two deliveries. Briefly stated the facts are these. About years ago she was considered to have been pregnant. Her abdomen was quite of the usual size of a nine months' pregnancy. Breasts were enlarged, the deepening of the black colour about the nipples was noticed. Herself and all the relations were expecting a baby. This proved futile. After two months of the expected time of delivery the woman began to pass urine with thick sediment of somewhat reddish appearance. This continued for about three weeks and the abdomen went down. The Native-doctor, the relative, and the mother who are present in the hospital swear to these facts. The second, according to these two people was actually a delivery. This

happened nearly nine months ago. At this time the woman had all the signs and symptoms of pregnancy. It is said that she was delivered of a headless, limbless, and shapeless foetus - rather small in size. The mother took sometime to believe that this was no delivery in spite of my elaborate explanation to prove the absurdity of the statement. However, I have to believe one thing, *viz.*, the woman passed something through her widened urethra, possibly a big piece of blood clot. It is probable that the high pressure inside the vagina and uterus forced some quantity of blood into the bladder and that this slowly accumulated and was ejected through the urethra.

This time a Sub-Asst. Surgeon was called in as the placenta was not cast. He appears to have given them some explanation for the strange condition. Apparently they were not satisfied. So they called in another Sub-Asst. Surgeon after a few months, at whose advice the patient is now in the hospital.

A CASE OF HUGE OVARIAN CYST NOT OBSTRUCTING DELIVERY OF A CHILD.

(DR. B. SANJIVA RAO, L.M.S., *Masulipatam.*)

A patient by name Santhamma, female, aged 22 years, Indian Christian, was admitted into the Government Headquarters Hospital, Masulipatam, Kistna District, on 19th January 1925.

Her complaint was a huge swelling in the abdomen said to be of 10 months' duration.

History.—She attained age when she was about 14 years and betrothed before attaining puberty. She delivered a male child in about an year after attaining her puberty. Three years after attaining her puberty she

gave birth to another male child who died at about his 8th month. She became pregnant for the third time about 10 months ago. She delivered a male child 13 days ago.

Menstruation was quite regular and not attended with any pain from the time of her attaining age.

History of the swelling.—Patient says that she noticed a slight swelling, from the time the conception of the present child occurred. The swelling is said to have grown larger and larger gradually *pari passu* with the pregnancy till at the commencement of labour, she had a very large swelling of the abdomen, much larger than is expected to be present at full term. Labour pains commenced about 13 days ago in the small hours of one morning, and she went through the stages of labour without the least difficulty and was safely delivered of a male child by morning (dawn).

The patient is quite definite of not having had any trouble at all with the delivery and does not seem to have become a subject of any hardship in spite of the great inconvenience caused by the enormous abdominal swelling. There was no loss of blood beyond the usual amount nor any untoward circumstance worthy of note.

When the patient and her friends noticed the swelling of the abdomen did not subside with the expulsion of the products of conception, they looked for a twin pregnancy and were expecting the birth of a second child, but as time passed on, and as the patient showed no signs of delivery coming on, they gave up the idea of twin pregnancy and ascribed the swelling to a growth of some kind in the abdomen.

There was only a slight decrease in the size of the abdomen with the birth of the child. The patient says that since the birth of the child there has been no appreciable change in the size of the tumour.

She does not give any history of ever having suffered from fever or any other illness.

Habits.—There is a history of taking toddy occasionally in small quantities. No other condition worth noting.

Condition on admission.—A fairly healthy young woman with somewhat anxious expression and slightly sunken cheeks. Slightly anaemic. The skin over the back and face is extensively covered with white patches of *Tenia Versicolor*. Skin of abdomen covered with striae gravidarum.

Digestive system.—Tongue slightly coated with white fur. Appetite poor and because of want of appetite, she has not been taking much food from the time of the delivery of the child. Bowels constipated. *Spleen* not palpable. *Liver* appears to normal. The dullness of the tumour merges with that of the liver in its lower part.

Circulative system.—Pulse somewhat low tensioned and about 90 per minute. There is no swelling anywhere either in legs or face. Heart somewhat weak.

Respiratory system.—Nothing particular.

Urinary system.—Urine S.G. 1016. Reaction Acid. Albumin Nil. Sugar Nil.

Nervous system.—Sleeps well. Nothing particular.

Generative system.—There is no tear in the perineum and nothing abnormal. The parts appear slightly congested yet, and there is only a slight discharge (lochia).

Local Examination.—There is a huge uniform swelling of the whole of the abdomen of the size of a very large pumpkin (sweet) or about $1\frac{1}{2}$ times the size of the ordinary foot-ball. When lying down the slope of the swelling from the umbilicus to the ensiform cartilage is a gradually inclining one, whereas, from the umbilicus to the symphysis pubis, it is somewhat abrupt and dome shaped. In the recumbent posture the tumour appears to be slightly larger on the right side, but the difference is almost negligible, the uniformity of the swelling being the more prominent and striking feature. The shape of the swelling is globular with the inclines referred to above. Few slightly dilated veins are visible in the upper part of the abdominal wall. The measurements of the swelling are as follows :—

Over the umbilicus	..	..	39"
3" above the	..	..	38"
6" " " "	..	..	36"
3" below " "	..	..	38·2"
5" " " "	..	..	35"
From symphysis pubis to Xyphoid process	..	20·2"	
From the umbilicus to symphysis	..	8½"	
From the costal cartilage in the right mid-clavicular line to the middle of inguinal ligament.	17½"		
From the costal cartilage in the left mid-clavicular line to the middle of inguinal ligament	..	17"	
From the right anterior-superior iliac spine to the umbilicus	..	..	10"
From the left anterior-superior iliac spine to the umbilicus	..	..	9¾"

Palpation.—The tumour is very soft and cystic to the feel. There is hardly any resistance offered to the palpating fingers. Fluid thrill is easily obtainable all over the parts of the tumour.

Percussion.—Dull all over the tumour. The dullness is present both in the upper and lower parts and over the sides of the tumour. Shifting of the patient's position to the lateral aspects does not influence the percussion note in any way. There is just a tiny circular gap in the umbilicus (hernia). The umbilicus is flush with the rest of the abdominal wall.

Auscultation.—No sounds are heard.

With the patient sitting in bed, the tumour appears to fall forwards.

Measurements.	At the umbilicus	..	43"
	3" above ..	..	41½"
	6"	..	37½"
	3" below ..	..	41"

Progress and treatment.

Patient was put on Ergot mixture.

Motion was examined and found to contain ankylostome ova.

23—1—1925. Carbon-tetrachloride treatment.

24—1—1925. Lochia very little. Ergot mixture stopped and patient put on Mist. Ferri et Strychnine. 1 oz. t. d. after food.

30—1—1925. General condition of the patient is much improved. She has been taking milk and rice diet with 2 eggs daily.

4—2—1925. Measurements of the tumour taken again, but there was found to be very little difference from those noted above.

5—2—1925. *Operation.*—Usual preparation. Chloroform anaesthesia. Usual incision. Great omentum adherent over the left upper quadrant of the cyst. No other adhesions. Cyst tapped and one and half-bucketfuls of thick viscid and smoky fluid removed when it was found that the cyst had been reduced to about one-sixth of its original size. Trocar withdrawn and cyst brought out. Found to be originating from the right ovary. Small pedicle easily dealt with. Left ovary normal. Abdomen closed without drainage.

Temp. in the evening 100·8°F. Morphia at night.

6—2—1925. Patient quiet, had good sleep previous night. Temp. 99·4° in the morning and 100° in the evening.

7—2—1925. Bowels not moved. Ol. Ricini given. Did not act. S.W.W. enema given in the evening. Good result. Temp. 98·8 morning, 100 evening.

8—2—1925. Temp. 98 in the morning, 99·4 in the evening.

Operation wound inspected and dressings renewed. Wound healing.

9—2—1925 to 12—2—1925. Nothing to note.

13—2—1925. Stitches removed. Wound healed by first intention.

Thereafterwards recovery was uneventful except for a slight attack of dysentery which the patient developed with fever on 22—2—1925. This lasted a few days and yielded to ordinary treatment.

On 6—3—1925. Measurement over the umbilicus was taken and found to be 26½".

Patient was discharged cured from the Hospital on 7—3—1925.

Comments.

1. My main object in putting this case on record is to bring out the fact of the huge Ovarian Cyst not causing the least obstruction to delivery. Of course the whole point is that the tumour was not pelvic but abdominal and abdominal tumours however large they may be are said to produce little difficulty at the time of labour.

2. The child was fairly large and well developed. It did not seem to have suffered in any way from pressure of tumour.

3. Whether the duration of the tumour as given by the patient is correct or not is an open matter. It is likely she had a small Cyst even before the conception of the present child and may have missed to take any note of it. Absence of adhesions to structures in the abdomen, however, point to the fact of the Cyst being of recent development and very few attacks of inflammation of the capsules.

I have to express my thanks to Sub-Assistant Surgeons Mr. M. Nageswara Rao and Mr. Y. V. Basavayya Naidu for help at the operation.

To Mr. Sub-Assistant Surgeon P. Audinarayanamurthi I am specially indebted not only for the help he rendered at the operation but also for the care he took for the uneventful recovery of the patient after the operations.

ABSTRACTS.

From the British Medical Journal—20th September 1924.

On the view that it is the cells of the reticulo-endothelial system which elaborate bile pigment, and that the polygonal cells of the liver are chiefly concerned with its

passage into the bile capillaries, a new theory of jaundice has been developed. As an explanation of the two varieties of bilirubin distinguished by the "direct" and the "indirect" van den Bergh reaction, it has also been suggested that the bilirubin in passing through the glandular liver cells is modified in some way.

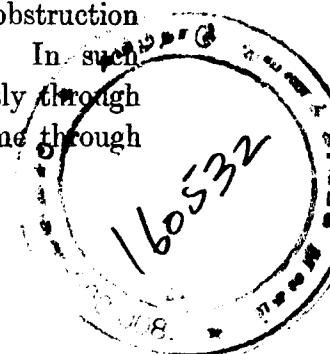
On the basis of this theory we may now consider in what circumstances icterus could arise. The following conditions may be enumerated:

1. Where bile pigment, formed in the cells of the reticulo-endothelial system, passes through the polygonal cells normally to reach the bile capillaries, but is obstructed there and finally reabsorbed into the blood.

2. Where, owing to damage to the polygonal cells of the liver, the bile pigment carried to them by the endothelial cells is unable to enter them. The bilirubin would therefore pass directly along the hepatic venous radicles into the general circulation. On the other hand, part of the bilirubin might pass through, and part be unable to do so.

3. Where, in excessive blood destruction, too much bilirubin is formed in the reticulo-endothelial system for the polygonal cells to deal with. In such circumstances some pigment might pass normally into the bile capillaries, and colour the faeces, while the excess might pass straight through the hepatic vein into the circulation and bring about jaundice.

4. Where, in addition to damage and disordered function of the polygonal cells, there is also obstruction in the bile ducts—for example, cholangitis. In such circumstances some pigment might pass directly through the hepatic vein into the circulation, and some through



the polygonal cells to be afterwards reabsorbed on account of obstruction.

What might occur in the event of damage to the cells of the reticulo-endothelial system? While we have no clinical diseases which at the moment would appear to be due to the disordered function of the reticulo-endothelial cells, there is experimental evidence from Lepehne that the blocking of this system by means of innocuous silver compounds may hinder the development of experimental hæmolytic icterus. It seems possible that some of the conditions associated with hæmoglobinuria rather than icterus (for example, blackwater fever, and some poisons) may later be brought into this category.

THE CLINICAL VARIETIES OF JAUNDICE.

Before going on to consider how this new theory agrees with the facts, which after all is the critical test, it seems best for clearness in subsequent argument to give some classification of the different forms of icterus, and I have suggested that in the present state of our knowledge the following is the most suitable and comprehensive arrangement:

- (1) Obstructive hepatic jaundice.
- (2) Toxic and infective hepatic jaundice.
- (3) Hæmolytic jaundice.

It will be found that all clinical varieties of jaundice can readily be made to fit into this classification, when considered in the light of the theoretical considerations described above, and in the light of the van den Bergh test. Some clinical forms, it is evident, must be placed in two of the divisions, as, for example, when toxic changes of the liver cells are combined with definite obstruction in the bile passages. The inclusion of the word "hepatic"

in (1) and in (2) is deliberate, and intended to indicate that the lesion is within the liver itself, either in the polygonal cells or in the bile capillaries. The omission of this word under (3) is equally deliberate, so as to indicate that the reticulo-endothelial system is by no means confined to the liver, but in higher animals is largely developed within the spleen.

THE VAN DEN BERGH REACTION IN THE CLASSIFICATION OF JAUNDICE.

It will be found that the grouping of jaundice given above agrees well with the results of the van den Bergh reaction.

Hepatic Obstructive Jaundice.—Hijmans van den Bergh showed that bile from the gall bladder gives a prompt direct reaction with the diazo-test, and that the same result is obtained in icterus due to complete obstruction of the bile passages—that is, when bile has passed through the polygonal cells before obstruction and absorption occurs (No. 1).

Hæmolytic Jaundice.—He showed also that in clinical hæmolytic jaundice, and in the bile pigment produced in hæmorrhagic effusions into serous cavities, a delayed or negative reaction is obtained with the diazo-test. It is suggested on the theory of jaundice described that this result occurs when bile pigment has not passed through the polygonal hepatic cells (No. 3).

Toxic and Infective Hepatic Jaundice.—In the toxic and infective types of jaundice Feigl and Querner showed that the van den Bergh test gives a biphasic result, which has been interpreted as a combination of the prompt-direct and the delayed-direct reactions. The explanation is offered, on the theory of icterus described, that in such

toxic and infective conditions some bilirubin has passed through the hepatic cells normally, while some, owing to the damage of the polygonal cells, has reached the circulation direct from the reticulo-endothelial cells (No. 2).

Combined Forms of Icterus.—As an example, so-called catarrhal jaundice may be taken. In this type of icterus the results of the van den Bergh reaction are very variable at different stages of the disease. Here it is suggested (*vide infra*) that the mechanism of the jaundice is a combination of functional derangement of the liver cells with obstruction due to cholangitis (No. 4).

How have these New Views and Methods Modified the Old Ones, and how have they Improved the Clinical Observation of Icterus?

The clinical use of the van den Bergh reaction has given us much new and valuable information by a study of the bilirubin in the blood. It is possible now to trace completely the whole progress of an attack of icterus. We know now that the colour of the skin and mucous membranes is a poor guide, and that much bilirubin may be present in the blood at a time when there is scarcely any general icteric tinge. We have come to recognize also that "green" or "black" jaundice must now be taken merely as a clinical expression of chronicity, and not of the amount of bilirubin retained in the blood. Further, we have learned the importance of "latent" icterus—a condition in which, in the obstructive variety, there is insufficient bile pigment in the blood to make the patient obviously yellow or to bring about biliuria. It is now known that in this form of latent icterus at least four van den Bergh "units" must be present in the serum before the threshold value of the kidney for bile

pigment is reached and biliuria results. Cirrhosis of the liver may be quoted as an example of latent obstructive jaundice. Moreover, diseases not hitherto considered in the light of their icteric nature at all have now, since the introduction of the van den Bergh reaction, been brought into the category of latent hæmolytic jaundice. The best example of this kind is pernicious anæmia, where a lemon-yellow colour of the skin was always recognized, and in which we now know bilirubin is present in the serum to the extent of two to five van den Bergh units. It is a suitable place here to point out that in hæmolytic jaundice the threshold value of the kidney for bilirubin is entirely different from that existing in jaundice due to obstruction. In all cases where the bilirubin gives an "indirect" reaction (for example, hæmolytic icterus), for greater quantities than four units of bilirubin may be present in the serum without a trace of bile pigment being excreted by the kidneys. It seems possible that in both varieties of latent jaundice, and in all varieties of overt hæmolytic jaundice, the bilirubin is excreted as urobilin, in whole or in part, but this is a matter on which further work is required.

As an example of the practical application of our new knowledge of latent icterus, recent investigations by Gerrard in cases of syphilis undergoing treatment with salvarsan are of much interest. Jaundice as a complication of salvarsan treatment is well known, and this observer, by routine examination of the blood, has been able to watch the development of latent icterus, in susceptible individuals, and stop the administration of the drug before actual icterus ensued. Finally, the van den Bergh reaction gives us a definite method of distinguishing

jaundice due to complete obstruction from hæmolytic icterus. In icterus due to incomplete obstruction, and in the toxic and infective forms, it yields no information of absolute diagnostic value to the clinician.

The new view of the activities of the reticulo-endothelial system has greatly influenced our attitude towards the forms of jaundice associated with splenomegaly, conditions which Eppinger has grouped on the basis of this view under the name of "liver-spleen diseases" (*Die hepatolienalen Erkrankungen*). The cure of such diseases by splenectomy—that is, by the removal of the main site of the reticulo-endothelial cells—in man and higher animals is in accord with this theory. Further, the theory gives us the most obvious explanation of the two varieties of the van den Bergh reaction, and seems to show reasonably how this reaction enables us to distinguish obstructive from hæmolytic jaundice.

SUMMARY, AND POINTS FOR DISCUSSION.

The term "jaundice" has been used as far as possible in its strict sense, to indicate a disorder of bile-pigment metabolism. Reference to changes in other constituents of the bile, and to other hepatic functions, have been omitted as making the discussion too wide.

A new theory of jaundice is described, which it is suggested may replace, as a working hypothesis only, the older classical views.

A classification is suggested, based on the new theory and on clinical observation of diseases associated with icterus.

The observations of Hijmans van den Bergh on the bilirubin in the blood, the activities of the reticulo-endothelial system in bile-pigment metabolism, the results of

animal experiments in relation to the occurrence of a true hæmolytic jaundice, and the conception of disordered function of the glandular cells of the liver as a cause of jaundice, are all discussed.

The following points, among others, seem to invite discussion :

1. How far does the theory of jaundice which has been suggested agree with observed clinical facts ?
2. How has the reaction of Hijmans van den Bergh modified our clinical attitude towards jaundice, and what is the meaning of the two varieties of bilirubin apparently differentiated by the test ?
3. What view is to be taken with regard to "hæmolytic jaundice," and to Eppinger's inclusion of certain diseases under the descriptive term "liver-spleen diseases" ?
4. What is the exact mechanism of one of the commonest forms of jaundice met with in this country—so-called "catarrhal jaundice" ?
5. How important in clinical medicine may be the recognition of (a) latent jaundice, and (b) dissociated jaundice ?
6. How far do these new views influence medical and surgical treatment ?—
 - (a) Jaundice and splenomegaly.
 - (b) Differentiation of obstructive from other forms of icterus.
 - (c) Protection of the glandular cells of the liver (by glucose, etc.) against toxic and infective agents (chloroform, salvarsan, microbic infections).

HERBS IN AYURVEDA.

*From the Journal of Ayurveda—September 1924.*A THESIS ON SEMICARPUS ANACARDIUM OR THE
DHOBEE'S NUT.

BY THE LATE HEM CHANDRA SEN, M.D. (CAL.).

THE marking-nut tree (*Anacardiaceæ*), syn. *Semicarpus Latifolius*.*Vernacular names.*—Bhallataka, arushkara—Sanskrit
Bhela—Bengali; Bhilawan—Hindi; Beladin—Arabic;
Bilader—Persian.*References.*—Watt's Dictionary, S. 1041, etc., Roxb.
Fl. Ind. Ed., C. B. C., 269; U. C. Dutt's *Materia Medica*,
141, 292, 293; *Pharmacog Ind.*, Vol. I, 389, etc.*Habitat.*—It is a native of all the mountainous parts
of tropical India. Flowering time—from May to August;
fruits ripen in January and February.

OFFICIAL PART—THE FRUIT.

Description.—A large tree with erect trunk and
numerous spreading branches. Leaves about the extre-
mities of the branchlets, alternate, petioled, large, oblong,
obovate, rounded at the apex; entire, 9 to 18 inches long
and 4 to 8 inches broad. Panicles terminal, very large,
composed of many spikes.*Flowers.*—Numerous, small, dull greenish-yellow.*Fruits.*—Nut resting on the large, smooth, yellow,
fleshy, cupshaped receptacle obliquely; obverse, reniform,
one-celled, one-valved, considerably compressed, longi-
tudinally striated and wrinkled, colour brownish-black,
and of a firm leathery consistence, composed of an exterior
and interior integument with numerous small cells
between.

“The *S. Anacardium* is well described by the Arabs
as resembling the heart of an animal. The torus repre-
senting the auricle, and the fruit the ventricles. In the
dry commercial articles the torus is seldom present, and
the fruit is of the size and shape of a broad bean, of a black
colour and quite hard and dry externally; but upon
breaking the outer skin with a knife, the central cellular
portion of the pericarp will be found full of a brown oily
acid-juice; inside the pericarp is a tin shell conforming
to it and containing a large flat kernel, which has no acid
properties. The root bark is very thick, and contains a
large quantity of acid-juice similar to that found in the
pericarp. It dries into a black varnish. Pericarp none.
Receptacles erect, fleshy, pearshaped, smooth; when ripe,
yellow, about the size of the nut.”

Seed.—A single nut resting upon the receptacle,
cordate, flattened on both sides, smooth, shining black;
the cover or shell of the seed is composed of two laminae;
the inner one hard, the outer one less so and leathery;
between them are cells which contain the black corrosive
resinous juice, which has long made them famous. This
juice is of a pale milk colour till perfectly ripe, when it
becomes black.

CHEMICAL COMPOSITION OF SEMICARPUS ANACARDIUM.

The almonds contain a small quantity of sweet oil;
the pericarp contains 32 per cent. of a vesicating oil of
sp. gr. .991, easily soluble in ether, and blackening on
exposure to the air.

It is similar to that of the *Anacardium Occidentale*,
but BASINER found that it dissolves in potassa with a
green colour, and its alcoholic solution turns black with

basic lead acetate. The fruit yields 2.14 per cent. of ash. (WARNECKE—*Pharmacographia Indica*).

DRS. SPIEGEL and DOBIN have analysed the oil occurring together with anacardic acid in the pericarp of the cashew nut (or of *Semicarpus Anacardium* or Dhobee's nut) and found that its composition is represented by the formula $C_{32} H_{50} O_3 H_2 O$.

Physiological experiments showed that the blistering action of the oil is probably due to the presence of substances dissolved in it. (*Pharm. Geselloch*, 1895).

PHYSIOLOGICAL ACTION AND USES OF SEMICARPUS ANACARDIUM.

External.—The acrid juice of the fruits and the oil are powerful vesicants and irritants. The eschars are usually black, sometimes pustular. The vesicles appear usually within 12 hours of the application of the oil or the juice, and multiply for some two or three days, the fluid from the broken vesicles causing a fresh crop on any part of the body coming in contact with the affected site. Malingerers sometimes use it to deceive doctors.

The oil has very powerful antiseptic properties, but is too strong an irritant to be used medicinally for any such purpose. Wooden posts are sometimes painted with the oil to protect them from white-ants.

The pain caused by the application of the oil is simply intolerable. Professor BASINER has also noticed painful micturition after the application of the oil over a large area. The urine in such cases is reddish-brown and bloody, and there are sometimes painful stools.

Exposure to the vapour of *S. Anacardium* causes erythematous eruptions accompanied by severe burning and itching in most cases.

Scaly skin diseases.—The oil mitigated with butter, or ghee (a drachm of the oil to four ounces of ghee) is used in scaly skin eruptions, *e.g.*, psoriasis, etc.; the affected part becomes softened with marked rapidity, and a normal condition returns. The strength may be varied according to the indications.

Leucoderma.—This application also does good in leucoderma. Sometimes the fruits are fried in mustard oil, and the oil is used for this purpose. The leucodermic spots show foci of fresh deposition of pigments, and after a prolonged use distinct change of colour is generally noticed.

Indolent ulcers.—For stimulating indolent ulcers, a compound oil, of which *Anacardium* is one of the constituents, is sometimes used with success. (See the directions for preparing this oil under "Forms of administration," below).

Internal—alimentary tract.—The mouth soon becomes dry, even with powerful medicinal doses. The oil is irritant to the whole of the digestive tract in big doses. In medicinal doses it increases appetite and powerfully increases the secretions, the stools being tinged deep yellow in the majority of cases. Partly by its own direct stimulating action, and partly by its powerful cholagogue action, it often acts as a purgative, especially in men of neurotic disposition. It has a special influence on the hæmorrhoidal veins and the lower part of the rectum, in some cases producing itchiness about the anus, and sometimes the mucocutaneous surface around the anus is found to be hanging down somewhat loose, especially so if affected with piles. The secretion of saliva is lessened and thirst is increased.

Owing to the irritant properties of the oil, this is invariably administered internally by Mahomedan and Hindu physicians mixed with butter, milk and ghee, or some other oily fluid. This precaution is essential, otherwise it produces extreme irritation of the mouth and gullet; even weak decoctions are to be administered in this way.

The kernel of this and of *S. Occidentale* has no irritant properties at all. It tastes like almonds, and is a good nutritive food. In fact, it is used in the preparation of sweetmeats in some districts of India. The peduncles also are pulpy and sweet when the fruits are ripe. They are eaten without danger.

As a general alterative, it is often used to increase appetite among other purposes. The power of digesting fats is enormously increased. It is also a powerful carminative.

S. Anacardium has been recommended for piles in Sanskrit books, but, in my experience, it apparently aggravates the trouble. The kernel of the fruit, which is only a food containing much oil, can be, however, used without danger. It produces some good perhaps by its slight laxative effect.

The fruits are said to have vermifuge properties, but I have never used it for this purpose.

Liver and spleen.—I have already mentioned that *S. Anacardium* is a powerful cholagogue. In jaundice it does good, but is to be used with caution. Excessive thirst and heat in the system, and burning sensation of the hands and feet, are to be regarded as contra-indications in a case of jaundice. It is beneficial in a cattarrhal condition, producing partial obstruction of the bile-passages.

In chronic enlargement of spleen it can be used with advantage when there is no hepatic complication of any marked degree and fever.

Circulatory system.—*S. Anacardium* is a good cardiac tonic. Under its influence many neurotic cardiac troubles are noticed to subside in a short time. The rate of the heart-beat is usually increased.

Respiratory system.—The drug is a general respiratory stimulant. It has been tried by me with success in several cases of pneumonia in the Campbell Hospital as well as in private practice. The conditions generally improve within three or four days—an ounce of the decoction (strength—2 drachms of the bruised fruits to the ounce) once or sometimes twice a day having been used.

If a fruit is heated in the flame of a lamp, and a drop of the oil allowed to drop in a pint or a half of milk, the milk can be used successfully in relaxations of the uvula and cough, especially in children. This use is current in Madras and some other places. The potency of the drug in asthma is very remarkable. The drug not only relieves the spasmodic attacks, but also tends to cure the disease by prolonged use. A course of treatment with the drug for a month or so in the winter is highly beneficial for asthmatics.

Nervous system.—In cases of mild poisoning, *S. Anacardium* causes mental disturbances, illusions, loss of memory and drowsiness. In medicinal doses no such symptoms are noticed. Usually an increase of mental vigor follows a prolonged use of the drug in suitable doses. It has decided sedative action on the cord, for it markedly relieves spasms. It is a stimulant to the sexual centres,

however, and is used as an aphrodisiac, especially by the Mahomedan Hakeems.

I have tried the drug in two cases of melancholia with satisfactory results.

Neuritis.—S. Anacardium has a very pronounced action in subduing all forms of neuritis. In peripheral neuritis including beri-beri, I have used the decoction with milk and ghee in gradually increasing doses with very satisfactory results. In 24 cases I tried the drug, and half of them recovered within a month. The others improved considerably, though I did not get the opportunity of observing them till complete recovery. I have also used the decoction in the peripheral neuritis of chronic arsenical poisoning with excellent success.

Sciatica.—In sciatica the drug often acts like a charm. The patients feel relieved usually within 48 hours. A chronic case of sciatica of eight months' duration and with apparent scoliases recovered completely in a month with the administration of the decoction in increasing doses. A case of facial paralysis of two months' standing and with well marked symptoms was completely cured by a friend of mine in private practice under a course of twenty-five days' treatment with the decoction.

Paralysis.—The use of the drug in paralysis is especially noteworthy. I have found the drug efficacious in both the spasmodic and flaccid varieties of the disease. Several cases of paraplegia, spastic and simple, and many others of hemiplegia, have been successfully treated by me with this decoction.

Leprosy.—In Charaka and Susruta, the most important Ayurvedic works, the gradual use of 1,000 S. Anacardium fruits has been prescribed for leprosy. The

strength of the decoction is to be gradually increased, giving a decoction of 10 fruits the first day, increasing the number of fruits by one every day until a decoction of 30 fruits is taken. Then the strength is to be diminished gradually in the same way until it comes to the minimum, i.e., a decoction of 10 fruits.

In my experience the dose given above seems to be too large. I always regulate the dose by the feelings of the patient. The proper dose and forms of administration are described at large under a separate heading.

I have not had much experience of the drug in leprosy, but in few cases where I had occasion to use it, sensation seemed to return in recently affected parts, and the stiffness of fingers partially disappeared.

In leprosy, local application of the oil of hydnocarpus wightiana, which is allied to gynocardium odorata, is very valuable. I have identified the famous *Tubaraka* of the Sanskrit writers with hydnocarpus wightiana. It is very efficacious in chronic skin diseases, ulcers, leprosy and glycosuria according to Susruta.

Genito-urinary System.—S. Anacardium in physiological doses decreases the quantity of the urine, which is generally very high-coloured and sometimes quite bloody. It produces itching and burning of the urethra, frequent desire to pass water, and often with some difficulty in micturition. In medicinal doses it should not produce any urinary trouble. Difficulty in passing water is one of the signs of over-medication with this drug.

Dysmenorrhœa.—I have noted already the aphrodisiac properties of Anacardium. I have now to say that it is also one of the most powerful emmenagogues, and produces good effects in dysmenorrhœa and amenorrhœa.

In inflammations around the uterus (pelvic cellulitis and peritonitis) it has been used with much benefit.

The oil of *S. Anacardium* is a powerful abortifacient. It has been applied locally for criminal purposes.

Skin.—*S. Anacardium* is a powerful diaphoretic.

General disorders.—To remove the myotatic irritability in fevers with meningeal complications, I have used the drug in the decoction form in some cases, most of which recovered. I think this remedy should have extensive trial in fevers complicated with nervous symptoms. Two cases of cerebrospinal meningitis recovered in the Campbell Hospital after being treated with *S. Anacardium*.

In syphilitic, rheumatic and gouty complaints *S. Anacardium* is one of the best remedies I ever came across. I had occasion to use it several times in acute gouty troubles, where the effect was simply wonderful. The agonising pain and tenderness which had yielded to no other treatment passed away in 24 hours; threatening inflammation subsided in no time, and within two or three days the patients were decidedly relieved.

General tonic.—It is believed by the Indians that if the drug be taken internally in small but gradually increasing doses in the winter, it makes one free from coughs and colds and senile degenerations. I have seen a man, now 108 years old, who has been using a confection of the drug for many years during winter.

It is remarkable that the man is yet fairly strong, his hairs have not turned grey, and his teeth have not fallen out, although his power of hearing is very deficient.

It is after all not a bad plan to try the drug in chronic nervous and phlegmatic disorders when all other treatment has failed. Men of weak constitution may be really benefited by a judicious course of the remedy in the winter. It requires some skill, however, to be able to use the drug for this purpose.

Chronic glandular enlargements.—In chronic glandular enlargements of syphilitic or scrofulous origin, *S. Anacardium*, in combination with mercury, has been prescribed in Hakeemi and Hindu books. I have often used it successfully in this class of cases. The recipe I generally follow is this :—

Take of <i>S. Anacardium</i>	..	two tolas.
<i>Ptycholis ajowan</i>	..	two tolas.
Mercury	..	one tola.

The *S. Anacardium* fruits are cut into pieces. Brick-dust or blotting paper is used for soaking the oil. Then the three are rubbed into a pill mass. The pills are to be made of the size of a pea. They are administered with *dahi*.

MODES OF ADMINISTRATION.

S. Anacardium is used in various forms. The Kavirajes of this country usually rub the divided fruits of *S. Anacardium* with brick-dust in order to get rid of the oil. I do not think this is necessary, as I can eliminate the oil easily by straining the decoction through thick linen. The first and most handy way is the decoction.

(1) *The decoction.*—"The ripe fruits are to be divided into several thin pieces and bruised. If they are fresh and moist, they are to be boiled with eight times their weight of water; if they are dry, with sixteen times their weight of water. The water is to be reduced to one-fourth

of its volume and strained. Every morning this is to be taken with milk and ghee in sufficient quantity. It is essential that about half an ounce of ghee should be swallowed before taking the decoction to prevent the local irritating action of the drug" (Susruta).

Dose of the decoction.—I generally use the decoction in half an ounce dose to begin with, and gradually increase the dose according to tolerance of the patient. When the desired effect is obtained, I begin to diminish the dose gradually.

The maximum dose of the decoction used by me was eight ounces in 24 hours, but a medical man using the drug for the first time should be very careful in watching the feelings of the patient, and should the drug be found to disagree in any way, it should be stopped at once. It is worth noting here that the gradual increase and decrease of the dose of a particular remedy is a characteristic feature of the Hindu system of medicine.

The long pepper is used in the same way for diseases of the liver and spleen, pulmonary affections and various fevers.

The restrictions to be observed by an individual taking the decoction are the following : walking in the sun, excess in sexual intercourse, and excessive indulgence in nitrogenous food, food poor in fats, etc.

It is important to mention a singular fact of my observation. When a patient taking Anacardium takes no salt and water (using plenty of ghee, milk, starchy and saccharine food instead), he is often noticed to derive marked benefit within a very short time. This restriction is, however, not essential ; but if the patient can obey it, he will be more than compensated for his privation.

When using the drug in obstinate cases, I think one should try to see this restriction enforced before one condemns the drug as useless.

(2) *The confection.*—The next most common form of using Anacardium is a confection with milk and ghee, commonly known as *amritabhallatakam* :—

“Take eight seers of fully ripe fruits of *S. Anacardium* and rub them with brick-dust for some hours and wash off. Dry them in the open air, and cut them into pieces. Boil in four times their weight of water (32 seers) until the water is reduced to eight seers. Strain the decoction and add to it, when cool, eight seers of milk. Boil again and reduce to one-fourth. Strain again and boil with four seers of ghee. When the whole is of the consistency of a confection, sprinkle four seers of sugar over it, and mix it well. When cool, the mass is to be kept under a large heap of paddy or barley corn for seven days, when it will be ready for use.”

Dose— $\frac{1}{2}$ to 2 tolas (1 tola—3 drs. and 12 grains approximately).

No restriction need be obeyed when this form of *S. Anacardium* is used.

(3) *The oil.*—The third and somewhat dangerous form of administering the drug is the oil situated in the intercellular spaces between the two laminæ of the seeds ; it is ordered to be prepared in the following way :—

“Divide the fruits into pieces and put into an iron vessel having a number of holes at the bottom. Place a second iron vessel below this, and apply heat to the sides and top of the upper vessel. The thick tarry oil will trickle down into the lower pot.”

Dose of the oil, 1 or 2 m. with butter or cream swallowed in a mass.

This oil is advised by Charaka to be taken with eight times its volume of honey and twice its volume of ghee. It is also suggested in that work that the drug can be used in any suitable form, but always preferably with a bulk of bland, starchy, saccharine or oily things. I may also note in this connection that Charaka goes so far as to say (and I have reasons to believe that there is little hyperbolism in the statement) that "there is no phlegmatic diseases, nor any disease connected with suppressed secretions and excretions, which is not benefited by a judicious administration of *S. Anacardium*."

(4) I shall next cite some compound prescriptions containing the drug:—

I. Compound decoction No. 1.—

S. Anacardium fruit, golancha (*Tinospora cordifolia*), ginger, devadaru (*pinus deodara*), haritaki (chebulic myrabolan), punarnava (*boerhaavia diffusa*), and dashamul [or the roots of the following:—*Bilwa* or *bæl* (*ægle marmelos*), syonaka (*colosanthus indica*), Gamnbari (*gmelina arborea*), patala or parul (*bignonia suaveolens*), ganikarika (*premna serratifolia*), salaparni (*desmodium gangeticum*), prisni-parui (*uraria lagopodioides*), brihati (*solanum indicum*), kantakari (*solanum xanthocarpum*) and gokshura (*tribulus terrestris*)].

Take equal parts of each to make 2 tolas altogether. Boil in half a seer of water and reduce to one-fourth.*

* The reader will notice that in Hindu medicine, whenever a decoction is ordered, the total quantity of the ingredients is usually two tolas, boiled in half a seer of water and reduced to one-fourth.

Strain and administer in one dose. This and the following preparations are prescribed for paraplegia.

II. Compound decoction No. 2—

Take of long pepper, root of the long pepper and *S. Anacardium* fruit equal parts to make 2 tolas altogether and boil as before.

III. The pulpy portion of the peduncles of ripe *Anacardium* fruits and sessamum seeds—1 tola of each sweetened to taste with sugarcandy—is very useful in piles.

IV. A compound confection containing sessamum seeds, chebulic myrabolans and *Anacardium* fruits—equal parts, bruised and made into a paste with treacle—is useful in piles, asthma, bronchitis, anæmia and some fevers.

I. A Compound Oil.—Take of mustard oil 8 oz.; neem bark (*azadiracta indica*), nux-vomica seeds, *S. Anacardium* fruits, each $\frac{1}{2}$ oz. Fry the last three ingredients in the oil and strain off.

This oil has been used for leucoderma and to stimulate indolent ulcers.

Season of administration.—Winter is the best season for the use of *S. Anacardium*. It being a very heating remedy, its dose cannot be pushed to any length in summer. Of course, in suitable cases, I have used it in every season.

Contra-indications.—A bilious temperament, hæmorrhagic diathesis, pregnancy (because *S. Anacardium* is an abortifacient), diarrhœa, dysentery and gastritis.

As it produces dysuria, it is also contraindicated in inflammatory diseases of the kidneys. I have also noticed that when the bowels are constipated, the drug does not act so well. It is better to use a mild purgative before its administration.

OVERMEDICATION WITH S. ANACARDIUM.

Symptoms.—The first sign of overmedication with this drug is excessive perspiration, great thirst and burning of the skin. Difficulty in micturition may be simultaneously noticed with this, or later on.

The urine becomes high-coloured and scanty. Some observers have noticed that the urine is even tinged with blood when the drug is continued recklessly. Bowels become irritable and loose, and there may be much griping. If the drug is still continued, the patient often notices erythematous eruptions in different parts of the body. These eruptions are accompanied with severe itching and burning. In certain nervous subjects there may be drowsiness also, but this is somewhat rare. An assistant of mine, while exposed to the vapour, behaved temporarily like a mad man. He began to laugh when there was no reason for laughter, and could not understand well what was spoken to him. This was, however, a unique instance, for no other assistant ever showed such symptoms when he exposed himself carelessly to the vapour. My servants are always directed to anoint their bodies with cocoanut oil, or some other bland fatty substance, whenever they have to prepare the decoction in any large quantity. When this precaution is neglected, the rash is most likely to appear.

Treatment of overmedication.—With mild toxic symptoms it is often not necessary to stop the drug altogether, only a reduction of the dose being sufficient; but if there is any great difficulty of micturition or any rash, S. Anacardium should at once be omitted.

Several antidotes are used for the treatment of the toxic symptoms produced by this drug. These are the albumen of the cocoanut, sessamum seeds, the chebulic

myrabolan, and so forth. I have obtained the best results by using the first antidote. The milky juice of the albumen of cocoanut, sweetened to taste, is to be drunk in large quantities, and as soon as there is the full purgative action, the itchiness, rash, etc., disappear.

Any saline purgative also serves the same purpose.

The itchy parts are to be covered with lint soaked in Goulard's lotion. I have seen this plan to succeed in many of my patients.

CONCLUSION.

S. Anacardium is a very valuable drug in the treatment of nervous disorders mentioned in the text. The precautions of using milk and ghee must not be forgotten.

If this drug be used extensively by scientific practitioners, I am sure they will recommend its introduction into the British Pharmacopoeia.

Many poor people hold a *mela* once a year. During this ceremony they take its decoction with milk, ghee and honey or sugar. This keeps them free from any disease for a long time. During winter, consumers of this drug can sleep in the open fields without warm clothes.

I have been using this drug for more than six years without seeing any bad effect other than erythematous rash. In the Campbell Hospital I have made many bed-ridden cases of paralysis walk about in the hospital compound.

I am highly obliged to my friend Kaviraj GANANATH SEN, of Calcutta, who has materially helped me in writing this article.

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