anterior aspect of the abdomen uncovered, his stomach moderately filled with water, the tube passed down, and the lamp lit. In most individuals a distinct area of illumination became visible. If the parietes were laden with fat the light either could not be transmitted through them, or only dimly. The normal stomach afforded a small rounded area of illumination, a small round portion in the centre showing more brightly where the stomach wall approached the external surface most closely. The area was situated in the middle line a little above the umbilicus.

In dilatation of the stomach the illumined area was larger, more wedge-shaped, the apex of the wedge downwards, and over a lower part of the abdomen, the centre perhaps as low as the umbilicus. In gastropnoxis the whole area was shifted down to just above the pubes.

2. THE DEGLUTABLE STOMACH ELECTRODE (Fig. 2).

Einhorn's deglutable electrode was then shown. A very fine (1 mm.) rubber tube enclosing a thin soft wire was at one end connected with the negative pole of a battery, at the other with a metallic button lying within a hard rubber capsule with a number of perforations in its wall. The patient drank a tumblerful of water, placed the capsule on the tongue far back, and with the aid of some more water swallowed it.

Fig. 2.—The deglutable stomach electrode.

A mark on the tubing served to show when the capsule had gone down far enough. The electrode connected with the positive pole (its form was a matter for individual selection) was then placed on the skin where desired. The circuit, of course, was completed by the water in the stomach, which, passing through the perforations in the covering of the capsule, came in contact with the metal button, while at the same time all direct conjunction of the mucous membrane and the metal was avoided.

3. THE STOMACH BUCKET (Fig. 3).

To enable the physician to withdraw a small but sufficient amount of material from the stomach for testing purposes in cases where the stomach tube could not be tolerated, Dr. Einhorn had invented a small metal bucket, which could be swallowed with the same facility as an ordinary gelatine capsule, and which could be recovered again *plus* some contents by means of a silk cord attached to it. The bucket itself was of capsule shape, made of silver (1.75 cm. by 0.75 cm.); the upper end was partly open, with a bar of metal spanning the opening, to which the silk cord was tied. The

Fig. 3.—The stomach bucket.

method of swallowing the bucket was the same as for the electrode, except that no water was to be used. When the bucket had been in the stomach for a minute or two, it was withdrawn by traction on the silk cord. Should resistance to its passage upwards be afforded by the cardiac opening, the patient was directed to perform the movements of deglutition. If there were considerable quantities of mucus poured out by

the mucous membranes of the fauces and gullet, the aperture of the bucket might be covered with a film of gelatine, which, as a rule, did not dissolve until immersion in the gastric fluids.

4. THE GASTRIC SPRAY.

Another instrument shown on behalf of Dr. Einhorn was the gastric spray. The spray consisted of a soft rubber stomach tube terminating in a nozzle with a fine opening, and connected at the upper end with a tube which passed through the cork of a bottle fitted up in the ordinary manner for producing a spray by means of elastic force bulbs.

A small case containing a stomach bucket, and an outfit sufficient for the clinical investigation of the fluid withdrawn by it, was also shown.

ON MENSTRUATION AND OVULATION IN MONKEYS AND IN THE HUMAN FEMALE.

By WALTER HEAPE, M.A.,
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MENSTRUATION in monkeys was described by Rengger as occurring at irregular periods in cibus, by Saint Hilaire and Cuvier as a regular monthly discharge in cercopithecus, cynocephalus, and macacus, and by Sutton as fairly regular in macacus. The late Mr. Bartlett, superintendent of the Zoological Gardens in London, and Mr. Sanyal, superintendent of the Zoological Gardens in Calcutta, both assure me that monkeys menstruate regularly in their establishments, and I myself have observed regular menstruation in *semnopithecus entellus*, *macacus cynomolgus*, and *cynocephalus porcarius*, during the short time specimens of these animals were under my notice in Calcutta. *Semnopithecus entellus*, living in the jungles on the south bank of the Hooghly, has a definite breeding season, and it is to be noted that the specimens under my notice for three months menstruated regularly, although it was not their breeding season. Dr. Aitchison assures me that *M. rhesus*, living in the hills at Simla, also has a definite breeding season, and I have very strong evidence that the same species living around Muttra in the plains has a definite breeding time, although it is a different time from that given me by Dr. Aitchison for *M. rhesus* at Simla.

Although absolutely regular menstruation throughout the year is not definitely proved for all species of monkeys, still it is quite certain some of them menstruate during the non-breeding period, and this is a fact to be noted, for it would appear to be a connecting link between the lower mammals who come on "heat" only at breeding times, and the human female who is, generally speaking, capable of breeding at all times. This relationship is brought still closer by the facts that some women, of peoples who live very far north, do not regularly menstruate during the winter months, and that a special breeding season among human beings is not only suggested by the customs of widely-separated peoples but is actually observed by some of them.

The histological phenomena of menstruation, exhibited by *S. entellus* and *M. rhesus*, is divided into four periods. Periods of rest, of growth, of degeneration, and of recuperation. The period of growth shows two well-marked stages, the growth of stroma and the increase of vessels, while the period of degeneration has four well-marked stages, the breaking down of vessels, the formation of lacunæ, their rupture, and the formation of the menstrual clot.¹

Two processes of peculiar interest are noticeable in this menstrual history—the behaviour of leucocytes and the remarkable adaptability of the uterine mucosa tissue. The leucocytes are early attracted to the peripheral vessels, presumably by the degenerative changes which are going on in the tissue there; they arrive in great numbers, but the waste products are otherwise disposed of, by the denudation of the superficial mucosa, before the great majority of leucocytes have time even to attack the offending degenerate tissue. Many of them are contained in the discarded tissue, but few migrate from the vessels, and large numbers are to be seen adhering to the ruptured walls of the vessels; later they are again seen within the newly-formed vessels retiring from the field. This is what happens during healthy menstruation, but in cases of suppressed menstruation they are probably

actively engaged, and in many diseases of the menstrual organ play a very important part.

As regards the adaptability of the mucosa tissue, it is chiefly of interest as evidence of the archaic nature of that tissue. The devastation witnessed within the uterus when the mucosa is denuded is astonishing, and yet a few days afterwards it is again possessed of glands, blood vessels, and superficial epithelium. This happens every month, and it is a remarkable feat of which no other organ in the mammalian body is capable. Moreover, it is noticeable that by far the larger number of capillary blood vessels, together with some of the epithelium, is formed from the indifferent elements of the mucosa—a remnant, it seems, of that power of reproducing lost parts which some of the lower animals possess.

A review of the various modern views of menstruation in the human female leads to the opinion that it will be found that while the histological phenomena accompanying menstruation in the latter may differ somewhat in detail from those in monkeys, they are practically identical processes; further, menstruation and "heat" are very much more similar than has hitherto been recognised.

With regard to the relation of ovulation to menstruation, if it is granted that menstruation in monkeys is the same process as menstruation in woman, then it can definitely be stated that ovulation does not occur during each menstrual period, and that it does not necessarily occur during any menstrual period. In *S. entellus* and *M. rhesus*² I have shown that menstruation frequently occurs without ovulation—probably this is the case during the whole of the non-breeding season; while Leopold and Miranoff have shown that ovulation may occur independently of menstruation in the breeding human female.

The want of power to ovulate is no doubt one of the causes of sterility, and the importance of all considerations dealing with the process of ovulation is obvious to those who have to combat sterility. It is a fuller knowledge of the cause of ovulation which is required, and it is hoped it will be forthcoming and be found of assistance to those who desire to induce ovulation.

NOTES.

¹ The various stages may be followed with the help of the drawings in Mr. Heape's paper on "The Menstruation of *Semnopithecus entellus*" (*Phil Trans.*, vol. clxxxv, 1894.) ² The Menstruation and Ovulation of *Macacus Rhesus*, *Phil Trans.*, vol. clxxxviii, 1897.

AXIS TRACTION WITH ORDINARY FORCEPS.

By JOHN F. LE PAGE, M.D.

THE method of delivery with traction in the axis recommended by Dr. T. Archibald Dukes in the *BRITISH MEDICAL JOURNAL* of November 5th as the "most powerful method" is open to criticism. I premise that axis traction has for one object the avoidance of "powerful" methods. *Arte, non vi* should be the watchword of every obstetrician. I take exception to his directions; "Keep both arms the whole time rigid and extended," "and pull with your back." "Fancy pulling an oar or anything else without using the back!" "One's whole strength can, when necessary, be exerted in urging the child's head in any desired direction," and the nurse is to "keep the patient on the bed." The last quotation has my unqualified approval, for it is an instruction which would commend itself as one of imperative necessity. It is, indeed, marvellous that with all this "powerful" traction, "no compression need be used unless the forceps are beginning to slip." As a matter of fact, this is certainly not so, but considerable compression would be necessary to prevent slipping whilst such Herculean efforts were in progress. It is erroneous to write, "let the handles assume their natural position close to the symphysis pubis," for, with the head above the brim, when the blades are in position the forceps are against the perineum, and not the os pubis.

Dr. Dukes expresses the opinion that "any intelligent man would use the instruments in the above way unless he were told to act otherwise." The intelligent man who did follow this method would, I am afraid, deserve censure.

I submit that, in view of the fact that our profession embraces thousands of young men who have not yet had much midwifery experience, and so have not had the material from which to evolve just and sound individual

opinions, but who still do as they have been taught because they were so taught, the foregoing advice is dangerous in the extreme, and, as contrary to the principles of the art, should be earnestly denounced.

Tactile dexterity in the conduct of instrumental labour, and not powerful traction, is an inevitable outcome of the advance in the science of midwifery during the past half century; an advance which leaves no excuse for conducting labour in an heroic manner, but which demands, as a precise art, the observance of scientific principles.

To denounce axis traction would be to repudiate a law in mechanics which is absolutely inviolable and unalterable; that is, that the direction of applied force, whether it be a *vis a tergo*, or a *vis a fronte* is always a straight line, whatever the shape of the instrument through which it is conveyed. The line of traction is not along the curve of the blades, but in an imaginary line from near their points to near the extremity of the handle. Hence the introduction of axis-traction forceps, which, by a second movable handle, allow of traction in a more backward direction. The arrangement advised by Dr. Dukes is not an axis-tractor, but a means by which the forceps are simply converted into a lever of the third class, the head being the weight, the end of the handle the fulcrum, and the lock the power. His directions are to "push with the right hand and pull with the left," that is to push the handle upwards and forwards, and pull the lock backwards. This is leverage, and is not admissible except for special purposes, such as lifting the head off the brim.

I entirely agree that axis-traction forceps do in many cases, especially in primiparæ, cause considerable pressure on the perineum. It is frequently quite impossible with them to use traction in the axis of the brim; and it was to obviate this pressure, and to allow of traction at any angle, and to supply a very ready and effective means of converting any ordinary long forceps in a moment, when *in situ*, into an axis-traction forceps, which overcome all the disadvantages of Tarnier's, Galabin's, and others, that my "axis tractor" was made some four years ago.¹

The figure shows approximately the relations of the long forceps, head, and pelvis. The line *A B* indicates the true axis, and *A D* the direction of power used with forceps; *A E* is the line of traction with the axis tractor, and it is obvious that by using the handle of the forceps as a guide, the whole of the force expended may be directed in the true axis *A B*; whereas traction with forceps alone is along the line *A D*, and is necessarily expended to a very considerable degree on the anterior