

and of the soleus. The plantaris is sometimes absent, or abnormally connected with adjacent parts above or below.

In the deep flexor muscles the most interesting varieties are in connexion with the accessorius, which is a remnant of the primitive wide attachment of the simple unsegmented flexor mass in the Urodelans to the bones of the leg, the tarsus, and the metatarsus. Accordingly extensions of it, or derivatives from or adjuncts to it, are often found spreading up the leg along the fibula, or widely connected with the tarsus. Below it is sometimes more largely united with the flexor digitorum than usual, or it joins the flexor hallucis or the lumbricales, or it gives off one of the flexor tendons of the toes. The varieties in the flexors of the toes consist chiefly in the closer union of the flexor digitorum and the flexor hallucis, as is the case in lower animals, and in the partial absence of the flexor brevis, or the blending of it with the flexor longus, which more particularly happens with regard to the division to the little toe.

On the dorsal aspect of the limb the quadriceps is but little liable to varieties. The portion of the tibialis anticus attached to the metatarsal bone is sometimes separate; and, further, is sometimes subdivided, one portion passing to the first phalanx, thus resembling the disposition of the extensor tendons to the pollex. Sometimes the tibialis anticus extends to the plantar fascia; or it ranges upon the dorsum of the foot, as in the hippopotamus. The peroneus longus seldom varies; though sometimes attached to other metatarsals in addition to the first, it rarely or never fails to reach the first. The other peronei often show their imperfect segmentation from the extensor digitorum by spreading upon the toes. Particularly is this the case with the peroneus tertius, the complete separation of which and its devotion exclusively to the tarsus is a human feature, and is related to the mode in which the fore part of the sole is planted fully upon the ground in man. The extensor digitorum sometimes shows a persistence of connexion with the metatarsal bones, with the extensor hallucis, and with the extensor brevis, which are reminders of the primitive oneness of the extensor mass, and which are evidences of imperfect segmentation of it. No instance had presented itself, however, of that extension to the fore part of the femur which is so frequent in other mammals. The varieties in the small muscles of the foot and hand were also discussed.

In indicating the relation between utility and variability, and showing that that which is most useful has, on the whole, the greatest stability, the Professor did not express any view as to the connexion between the two, or wish to prejudice the great questions associated with this subject and with the allied problem how that which is most fitted for its purpose in each animal and each part comes to be present. Other questions were alluded to. Whether, for instance, the variety in muscles which are of least importance, on the one hand, and in those which are peculiar to man, on the other, is an indication that those muscles are in process of being fixed in, or expunged from, the economy. Also, whether varieties are more or less frequent in the more advanced and more civilised members of the human family than in others. At present there is not sufficient evidence to furnish an affirmative answer to any of these questions, or to establish the hereditary transmission of muscular varieties which must be regarded as probable. The nerve-supply to the supernumerary muscles, in the few instances which have been described, seems to corroborate the view "that nerve-course is somewhat too arbitrary or too much regulated by convenience in each instance for us to be able to rely upon the disposition of the nerves as sure guides to the discernment, in difficult cases, of the homological relations of muscles and other structures."*

* Journal of Anatomy, vi. 56, Observations in Myology, p. 56.

SUBSTANCES INCREASING THE SECRETION OF MILK.—Various substances asserted to possess the above effects have recently been advocated. Dr. Ofinger, says *Il Morgagni*, recommends the use of *galega officinalis*, as both exciting the secretion, and improving the quality of the milk. He administers it in the form of syrup, and by tablespoonfuls daily. On the other hand, Dr. Barbaste (France), states that he has recently made use of *cuminum cyminum* with the very best effects, and that the peasant women of Dauphiné commonly employ the substance for that purpose.

DETERMINATION OF THE QUANTITY OF BLOOD DIFFUSED IN URINE IN HÆMATURIA.

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CONSIDERABLE importance has always been attached to the appearance of blood in the urine, and physicians have long desired some simple method by which they might estimate the quantity present in any given case. The methods hitherto proposed are tedious, require considerable manipulative skill, and are unsuited for clinical purposes. I therefore suggest the employment of the *colorimetric* method of analysis as a simple and ready means of ascertaining the quantity of blood present in urine.

The colorimetric method is founded on the following plan of procedure. I filled a number of tall cylindrical glass vessels, capable of containing 100 centimetres, with urine, and to each vessel I added a definite quantity of fresh uncoagulated blood; to the first vessel two minims, to the second four minims, to the third six minims, and so on. As 16·3 minims equal 1 cubic centimetre, it is obvious that the first vessel contained 1 part of blood in about 800 of urine, the second 1 part in 400, and so on.

The colours given, when viewed by transmitted light, on the addition of the different quantities of blood to 100 c.c. of urine were then noted—

(a) With urine containing two, three, and four minims, the colour imparted was a brown sepia, or *smoky tint*. This tint was even perceptible when only one minim was added, or 1 part in 1600.

(b) In urine containing five, six, seven, and eight minims, the colour passed gradually from the smoky tint to *bright cherry-red*.

(c) In urine containing ten, twelve, to sixteen minims, the bright cherry-red passed into a *dull maroon-red colour*.

(d) After the addition of sixteen minims the urine acquired a *deep chocolate-brown*; and after twenty minims it was impossible to note any further change of colour.

Each of the four colours above given exhibited variation of shade and intensity according to the amount of blood added, the reaction of the urine, and the original depth of the urine itself. These points need not be enlarged upon at present.

Having obtained four distinct colours by the addition of varying quantities of blood to urine, I had next to learn how far these artificial solutions corresponded with urines obtained from actual cases. For example, the urine obtained from a patient suffering from acute nephritis exhibited the smoky tint; compared with an artificial solution, it corresponded to one containing four minims of blood, or 1 part in 400. The two urines were then boiled, liquor potassæ added, and again boiled; the reddish-brown precipitate, consisting of phosphates and hæmatin, removed by filtration and incinerated. The ash dissolved in hydrochloric acid was submitted to volumetric analysis with permanganate solution standardised, so that 1 c.c. represented '0005 gramme of iron. Then it was found that the artificial solution required 7 c.c. of permanganate solution, denoting the presence of '0035 gramme of iron; the other urine required 7·2 c.c. of permanganate, indicating '0036 gramme of iron, thus showing a very close correspondence between the amount of iron derived from the hæmatin in both urines.

Other experiments with urines containing larger amounts of blood showed a similar correspondence.

From these observations the following clinical facts may, I venture to think, be deduced:—

1. That a *smoky brown* colour is imparted to urine when blood is present in quantities from 1 part in 1600 to 400. That a *cherry red* colour is given when 1 part in 350 to 200 is present. That a *dull maroon red* is given when 1 part in 150 to 100 is present. In more concentrated solutions, the colour assumes a *deep chocolate brown*.

2. That the quantity of blood which gives to urine these distinct colours is much less than has been hitherto supposed.

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