

that two nerve-systems do exist—the one for organic, and the other for animal, life. These two, however, are not separate and distinct, but form parts of the same central nervous system. Looking at this diagram of the upper cervical region of the cord, we see that the voluntary striped muscles may be divided into two groups, according to their nerve-supply, viz. a group supplied by the anterior (4), and one by the lateral horn of nerve-cells (3), and we know also that these two groups of nerve-cells separate from one another more and more as we pass into the brain region. So that we find for the muscles of the face a distinct separation of two groups, viz. (1) those which move the eyes and the tongue—these are supplied by nerves which arise from the continuation of the anterior horns; and (2) the muscles of expression and mastication, the nerves of which arise from the continuation of the lateral horn; and remembering how the smile, the laugh, and the snarl, as well as the action of swallow-

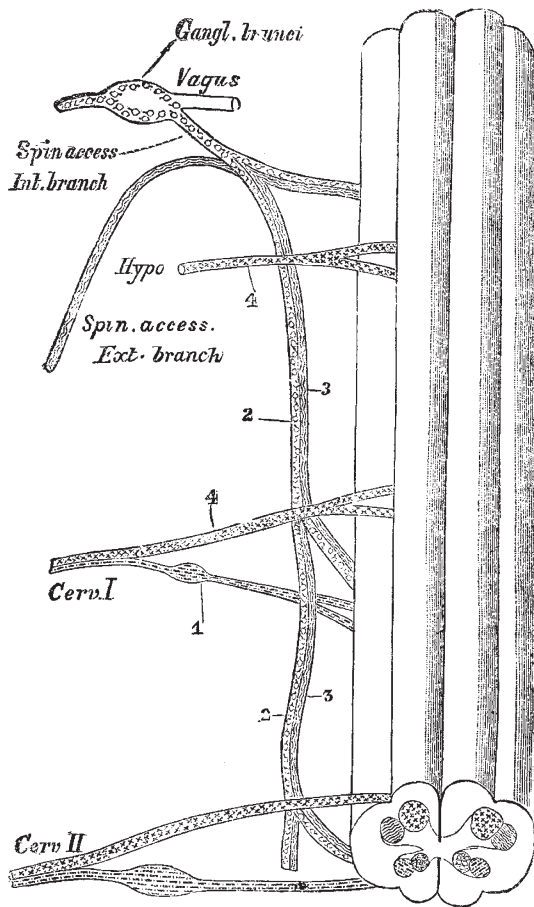


FIG. 2.

ing, are at the bottom only modified respiratory movements, we see that Charles Bell was not so far wrong when he inserted a lateral or respiratory system of nerves in between the anterior and posterior roots. This insertion is actually to be seen at the upper part of the cervical cord (Fig. 2) where a separate nerve is formed by elements which arise laterally, known as the spinal accessory; and what is most striking is this fact, that in this region the fine medullated fibres (2 in Fig.) are found only in connection with these lateral motor nerves, and not with the anterior motor, so that not only do these lateral or respiratory tracts supply special muscles with motor nerves, but these motor nerves have a closer relationship to the visceral nerves than other motor nerves. What is true of the upper cervical region is true also of the medulla oblongata. Here, again, the visceral fine medullated nerves are closely connected with the motor fibres which arise from the lateral horn, e.g. the chorda tympani and the facial. Undoubtedly this particular group of muscles has some closer relationship to the viscera than other trunk muscles,

and that relationship is explained immediately if we can accept and extend van Wijhe's investigations, viz. that in the cranial region the muscles which are supplied by the third, fourth, sixth, and twelfth cranial nerves are derived from the myotomes, while the muscles supplied by the seventh and fifth cranial nerves are derived from the lateral plates of mesoblast.

In fact we may look upon the body as composed of two parts—an outside or somatic part, and an inside or splanchnic part. Each part has its own system of voluntary muscles; each part is supplied by nerves arranged on the same plan, viz. a ganglionated and non-ganglionated portion; and each part has its own individual centres of action, the inside portion of the gray matter of the spinal cord containing the centres for the splanchnic roots (2, 3, 5, in Fig. 1), i.e. the centres of organic life; the outlying horns the centres for the somatic roots (1 and 4), i.e. centres for the animal life. It is a strange and suggestive fact that these two sets of centres are not arranged symmetrically along the spinal axis, but that two great breaks occur in which the centres of organic life fall into the background in comparison to those of animal life. These two great breaks correspond to the origin of the nerves for the legs and arms, and suggest that the formation of the limbs in the originally symmetrical ancestor of the Vertebrata—i.e. the large outgrowth of somatic elements in two definite portions of the body—caused of necessity a corresponding increase in the centres for animal life, while there was no necessity for a corresponding increase in the centres for organic life. The oldest part of us is undoubtedly the vital part; those organs and their nervous system by which the mere act of existence is carried on. With these two there may have been originally a symmetrically segmental arrangement of locomotor organs. Such symmetry, however, went for good when it was found more convenient to concentrate the locomotor machinery into the anterior and posterior extremities, and with the asymmetrical arrangement of the locomotor organs disappeared also the symmetry of the central nervous system. This correspondence between the plan of the central nervous system and the development of the extremities is, to my mind, strongly in favour of the view which I have put before you to-night. In conclusion, I thank you for the kindness with which you have listened to me, and hope that I have succeeded in convincing you that Bichat's teaching of an independent sympathetic system is finally dead.

### SCIENTIFIC SERIALS

*Revue d'Anthropologie*, troisième série, tome I, 1886, Paris.—On the colour of the eyes and hair in different parts of France, by M. Topinard. This paper will form the introduction to a comprehensive work, in which the author proposes to consider the various methods followed in other countries in collecting the necessary data for determining the racial significance of these physical characteristics. In France, where good charts of stature have been drawn up for the several departments, no statistical observations have been made in regard to the colour of the skin, eyes, and hair. This M. Topinard considers at length, both in its significance as a racial characteristic, and in regard to the modifications which it undergoes at various ages, and from different local surroundings. In considering the more or less typical series of colour, the writer draws attention to the extreme rarity in Europe of greenish eyes. In Germany, Prof. Virchow states that, among 6,000,000 persons, green eyes were noted only in six cases. Chinese annals record, however, that green eyes are met with in parts of Asia; and Pallas notes a similar fact in regard to Siberia. In concluding his exhaustive *résumé* of what has been done in other countries, M. Topinard states that he has addressed letters to the members of the French Association for the Promotion of Science, begging their co-operation in the collection of the necessary data for drawing up statistical tables of the relative proportion of the different shades of colour of the eyes and hair in various parts of France.—Illyrian anthropology, by Dr. R. Zampa. The author, who is well known for his able contributions to the ethnography of Italy, has turned his attention to the anthropological character of the Illyrian races, who occupied the South Danubian and other eastern trans-Alpine lands, to which tradition points as the original home of the earliest settlers of the Adriatic provinces of central and lower Italy. Dr. Zampa denies that the Illyrians were ever a homogeneous race, and he points out that while those of the north retained through the ages the character of

savage marauders and pirates, the South Illyrians, four centuries B.C., had been thoroughly amalgamated with the Macedonian and Epirote nations, adopting the pre-Hellenic form of speech of those peoples, which still lingers in the spoken tongue of the modern Albanians. After the incursions of Finns and Slavs into the Balkan and Danube territories, in the sixth and seventh centuries, the remnant of Illyrian and other primitive races that escaped extermination were comprised under the general name of Albanians; and Dr. Zampa believes that in the mountainous districts of Scutari we find the purest representatives of the ancient Albanian race. In this region, therefore, he has sought the data necessary for the elaboration of the comparative anthropological researches of the ethnic relations and differences existing between the Italian and other branches of the Albanian peoples. The author gives at length the results of his measurements of several series of crania obtained in Dalmatia, comparing them with those taken from living subjects; and although it cannot be said that his researches decide the question whence the Albanian Italians derive their origin, they throw important light on the early history of the primitive races of the Balkan Peninsula, and on their gradual amalgamation with the numerous invaders and alien settlers who, in the course of ages, have occupied the lands of the ancient Illyrians.—On trephining, as practised in Montenegro, by M. Védrenes. The question of prehistoric trephining, which first excited attention about ten years ago, has led to the consideration of the hitherto almost unnoticed fact that cranial trephining has been practised in Europe from the most remote ages to the present day. Indeed, according to M. Védrenes, the operation is also of frequent occurrence among the natives of Aurès, in Algiers, where it is held in high esteem as being both safe and beneficial. Here it is generally used to arrest the acute pains which are frequently experienced after severe injuries to the head; a portion of bone, about a centimetre in diameter, being cut out to admit of the introduction of a sponge for the removal of extravasated blood. A precisely similar operation is common in Montenegro, where, as at Aurès, it is performed by the members of certain families, amongst whom the profession of trephining has flourished for ages, and been respected as an hereditary distinction transmissible from father to son. The author draws attention to the curious circumstance that the practice of trephining and implicit faith in its efficacy have kept their ground, not merely in the semi-barbarous populations of Algiers and the Balkan mountain districts, but even among the miners of Cornwall, who have continued, to our own times, to regard this operation as the only adequate mode of treatment in various injuries to the head.—Contribution to the history of anomalies of the muscles, by M. Ledouble. The author considers that, while the pyramidalis abdominis, peroneus, palmaris, plantaris, and psoas parvus are more usually absent than any of the other muscles, the last-named is so frequently missing, that some writers have even assumed that its presence was abnormal. It is more frequent in women than in men; but for this peculiarity, as well as for the variations observable in the mode of insertion of psoas magnus and parvus, the author does not attempt to offer any explanation; his paper giving simply the result of his own observations of muscular anomalies in the lower animals, as well as in man.

#### SOCIETIES AND ACADEMIES

##### LONDON

**Royal Society, November 25.**—"On Jacobi's Figure of Equilibrium for a Rotating Mass of Fluid." By G. H. Darwin, M.A., LL.D., F.R.S., Fellow of Trinity College, and Plumian Professor in the University of Cambridge.

Jacobi was the first to prove that a mass of fluid in the form of an ellipsoid, with three unequal axes, is in equilibrium when rotating about the smallest of the three axes. The determination of the axes in terms of the angular velocity of the system has hitherto been left in an analytical form, not well adapted for numerical calculation. In the present paper the formulæ are brought into a shape involving elliptic integrals, and, by the aid of Legendre's tables, a table of solutions is calculated.

If  $\sigma$  be the density of the fluid,  $\omega$  the angular velocity, and  $\frac{3}{8}\pi\sigma$  the mass, then, when  $\omega^2/4\pi\sigma = \cdot 09356$ , the Jacobian ellipsoid is a revolutionary figure with axes 1'1972, 1'1972, 0'6977. For smaller values of the angular velocity the first axis increases and the two latter diminish. For example, when  $\omega^2/4\pi\sigma = \cdot 07047$ , the axes are 1'899, 0'811, 0'694.

When the angular velocity is infinitely slow, the ellipsoid becomes infinitely long and thin, and tends to assume a figure of revolution about its greatest axis.

Although the angular velocity diminishes as the length of the ellipsoid increases, yet the moment of momentum continually increases, and becomes infinitely great when the ellipsoid is infinitely long.

The kinetic energy at first increases with the length, attains a maximum, and then diminishes, so that when the ellipsoid is infinitely long it vanishes.

The intrinsic energy, however, always increases, so that the total energy of the system has no maximum, and continually increases with the length of the ellipsoid.

Approximate formulæ are given, which assume a very succinct form when the ellipsoids are long.

December 9.—"A New Method for the Quantitative Estimation of the Micro-organisms present in the Atmosphere." By Percy F. Frankland, Ph.D., B.Sc. (Lond.), F.C.S., F.I.C., Assoc. Roy. Sch. of Mines.

The author commences by describing some of the more important methods which have been elaborated for the bacterioscopic examination of air. In these he includes the experiments of Pasteur, Tyndall, Freudenreich and Miquel, Koch, and Hesse. After pointing out the several advantages and disadvantages which attend these processes, he describes a new method which he has devised, in which he has endeavoured to overcome some of the objections to which the others are open. The following is a brief description of the author's method:—

A known volume of air is aspirated through a glass tube containing two sterile plugs, consisting either of glass-wool alone, glass-wool and fine glass-powder, glass-wool coated with sugar, or sugared glass-wool and fine sugar-powder. The plugs are so arranged that the first one through which the air is drawn is more pervious than the second. After a given volume of air has been aspirated, the two plugs are transferred respectively to two flasks, each containing melted sterile gelatine-peptone, which are then plugged with sterile cotton-wool stoppers. The plug is then carefully agitated with the gelatine until it has become completely disintegrated, care being taken to avoid any frothing of the gelatine; and the latter is then slowly congealed so as to form an even film over the interior surface of the flask.

On incubating these flasks at a temperature of 22° C., in the course of from four to five days the colonies derived from the organisms contained in the plugs make their appearance, and can be readily counted and further examined. A very large number of experiments are recorded which were made to test the accuracy of the "flask-method." For this purpose experiments were made, in which sometimes single, and sometimes double plugs were employed, and it was almost invariably found that all the organisms were deposited on the first plug; the second plug, in the very exceptional cases when it did yield anything, rarely gave rise to more than a single colony.

It was also found that, whereas in out-of-door experiments a blank Hesse-tube, exposed side by side with the one through which air was being aspirated, contained a number of organisms,—thus creating an important source of error in the quantitative results obtained by Hesse's method,—in the "flask-method" such blank tubes rarely contained any organisms; and even when such was the case, but a very small proportion of those present in the actual tube.

This shows that, whereas in Hesse's apparatus any disturbance of the air during the experiment vitiates the accuracy of the result, in the "flask-method" no such effect is produced.

On the other hand, in the absence of aerial currents, the blank Hesse-tube contained only a few organisms, and a remarkable uniformity was found in the results obtained by Hesse's method and that of the author. This is important, not only as showing the quantitative accuracy of the "flask-method," but in clearly demonstrating that the organisms present in the air exist in an *isolated* condition, and not in aggregates, as suggested by Hesse, for it will be remembered that the plug is violently agitated with the gelatine-peptone in the flask, during which operation such aggregates would undoubtedly be broken up wholly or at least partially. It would therefore be reasonable to expect that the "flask-method" would yield a larger number, and possibly a far larger number, of colonies than found in Hesse's tubes; but since, on the contrary, the numbers agreed under the circumstances described in so striking a manner, it is shown convincingly that they exist in an isolated condition.

The paper is illustrated by photographs and drawings.