BOTANY

Floating Leaves of Marsilea

PROF. HILDEBRAND has noticed that if a plant of *Marsilea quadrifolia* (a species of the genus which furnishes *Nardoo*), is sunk beneath the surface of the water, so that all the leaves are more or less deeply covered, those leaves which are fully developed at the time of immersion, remain unchanged, while those which are not so far advanced, undergo a remarkable change; the petioles gradually lengthening in succession according to their position on the stem, and soon over-topping those which were already formed. At first the four leaflets do not increase, but they soon begin to enlarge, and by the time the surface of the water is reached, they exceed in size the ordinary leaves, forming a four-rayed star on the surface. While the petioles of the ordinary leaves are stiff, so that they stand erect out of the water, these floating leaves are weak and flexible, like those of water-lilies, allowing the leaf to maintain its position on the surface with the rise and fall of the water. Their upper surface is shining and coated with wax, so that the water flows off them. If immersed in deeper water, the petioles will lengthen still further, even to the extent of three feet. In these cases the formation of the organs of fructification appears to be suppressed. In the ordinary aërial leaves, stomata are found on both sides of the leaf in about equal numbers; in the floating leaves, on the other hand, the under side is entirely destitute of stomata, while on the upper surface they are about three times as numerous as in the aërial leaves; thus resembling *Nymphæa*, *Hydrocharis*, and other plants. (Botanische Zeitung.)

Alternation of Generation in Fungi

M. GAURIEL RIVET records in the *Bulletin de la Société Botanique de France* a remarkable illustration of this phenomenon in some very interesting observations on the "rust" of cereals. He finds that the Fungus which causes one of the common forms of this disease, *Puccinia graminis*, will not reproduce itself, but that if the spores are sown on the leaves of the common berberry, they give rise to the well-known orange spots of *Œcidium Berberidis*, generally considered as a fungus belonging to an entirely different group. The spores of the *Œcidium*, on the other hand, do not reproduce itself, but the *Puccinia*, thus furnishing a striking instance of alternation of generation. The connection of the berberry with the prevalence of rust in wheat was noticed by Sir Joseph Banks as long ago as 1806. In the commune of Genlis (Department of Côte d'Or) a railway company not long since planted a berberry hedge on one of its embankments; immediately the crops of wheat, rye, and barley in the neighbourhood became infested with rust. The remonstrances of the farmers caused the appointment of a commissioner to inquire into the subject, who, after a full inquiry, reported that wherever the berberry is planted the cereals are more or less attacked by rust; where they are absent the crops are free from disease, and that the planting of a single berberry bush is sufficient to produce the rust where it has never appeared before.

PHYSICS

Products of Respiration

PETTENKOFER and VOIT have been making some observations, by the help of their famous dog, on the products of respiration during starvation and during a diet entirely composed of fat. They find the most notable effect of the fatty food to be *a diminution of the oxygen consumed*. Thus in one series, on the 6th and 10th days of a period during which nothing but water was taken, the oxygen consumed amounted to 358 and 302, the carbonic acid given off to 366, 289 grammes respectively. On the 2nd, 3rd, and 8th days of a similar series the quantities were of oxygen consumed 371, 358, 335; of carbonic acid given off 380, 358, 334 grammes. When, on the other hand, 100 grammes of fat were taken daily, the 8th and 10th days of the series gave respectively 262, 226 grammes of oxygen consumed, 302, 312 grammes of carbonic acid exhaled. (Zeitschrift für Biologie, bd. iii., p. 369.)

In these observations Voit finds support of his views on the nutritive influence of fat, and bases on them an explanation of Bantingism. To bring down a fatty body, he says, we must get it to take in a larger supply of oxygen. This can best be done by cutting off all the fat and carbo-hydrates and increasing the quantity of proteids. The effect of increasing the proteids is to augment the metamorphosis taking place in the blood and diminish the storing up of material in the tissues in the shape either of flesh or fat. The store of fat existing in the body is consequently more and more encroached upon, and in spite of the great metamorphosis taking place in the circulation, the body continues to get lean. A very long discussion on the *modus operandi* of fat as food (of which the above forms a small part only) will be found at p. 329.

The same observers have also examined the respiratory products in the case of a man suffering from Leukaemia, a disease in which there is an undue abundance of white corpuscles and scantiness of the oxygen-bearing red ones. They find, however, no marked difference in the respiratory products; in amount these closely approximate the standard of health. (Ibid. p. 319.)

G. Quincke on Specific Cohesion and Capillarity Constants

VARIOUS bodies were formed into drops, which were allowed to fall on a platinum or porcelain plane; after they had acquired the temperature of the surrounding air, certain measurements were made of their dimensions. The square of the vertical distance in millimeters of the upper surface of the drop from the vertical element of its meridian curve is the constant of specific cohesion, from which, by a method of calculation stated by the author, the capillarity constant can be inferred.

Fused substances of similar chemical composition, and at a temperature very near to their melting point, have the same specific cohesion.

Water, carbonates, and sulphates in the liquid state have double the specific cohesion of mercury; the same is true for the nitrates, metallic chlorides, sugars, and fats; metallic iodides and bromides have only half the mercurial value.

Lead, bismuth, and antimony have the same specific cohesion as mercury; platinum, gold, silver, cadmium, tin, and copper twice that amount; zinc, iron, and palladium thrice, and sodium six times the specific cohesion of mercury.

PHYSIOLOGY

Microcephalous Children

DR. BUCHNER has measured lately the *crania* of two *microcephalous* children, and by way of comparison adds the cranial measure of his own healthy infant son.

	Helena Becker.	Sophia S.	W. Büchner.
Age	6½ years.	3 years.	3 years.
Circumference of head.	13½ inches, Rh.	16¾ inches.	20½ inches.
From ear to ear	6½ ,,	10 ,,	12½ ,,
From root of nose to occipital protuberance	8¾ ,,	10½ ,,	14 ,,

In both cases the size of head has apparently remained stationary from birth, and both children were born with closed *fontanelles*. One of the children is now exhibited at Darmstadt. Her height is 3½ feet; she cannot speak, walk, or stand, or seize hold of anything; in fact she is in a state of complete helplessness, with involuntary action of bladder and rectum. The upper portion of her skull, not larger than a man's fist, roof-like, flattened at the sides; the absence of forehead, a long aquiline nose terminating in a sharp point, an exceedingly diminutive receding chin, and a mouth with irregularly set teeth, with the orbital regions very prominent, give her quite an animal aspect. The mental phenomena are below zero; and the senses, though seemingly active, produce no ideas; her look is staring, vacant, devoid of expression; only bright shining objects and music attract her attention; she does not laugh but utters inarticulate animal sounds. Another characteristic feature is, that her limbs and head are subject to an involuntary unceasing agitation, like the reflex movements of a decapitated frog; she suffers also from a great want of sleep.

DR. OMANZA describes a method of registering photographically the beats of the pulse. The apparatus essentially consists of a small inverted funnel, having a long narrow stem and a caoutchouc base. This instrument is filled with mercury to a certain distance up the stem, and its base is applied to the heart or an artery; the oscillations of the mercurial column are then photographed by well-known processes. It is said that with this apparatus the apparently single stroke of the pulse is shown to consist of three, or even four, in succession.