

THE DISCOVERY OF ANOTHER CONNECTING LINK BETWEEN FLOWERING AND FLOWERLESS PLANTS.

NEWS has recently reached Europe, from Japan, of a botanical discovery of unusual interest and importance. Two investigators, Prof. Ikeno (*Botan. Centralbl.*, 1897, 1) and Dr. Hirase (*ibid.*, 2 and 3), working independently, have observed the formation of antherozoids—bodies which have hitherto been regarded as exclusively confined to flowerless plants—in two groups of gymnosperms.

It is well known that in a large number of cryptogams, including all the higher forms, the process of fertilisation is intimately connected with the presence of water. The spores (or, at any rate, certain of them) give rise on germinating, sooner or later to cells from which free-swimming antherozoids are liberated. Each of the latter consists of a loosely coiled nucleus ensheathed in protoplasm, which is especially abundant at the anterior end of the body, and from it arise the cilia which enable the antherozoid to move through water.

In the flowering plants, on the other hand, with their special adaptations to a terrestrial mode of existence, it is of obvious disadvantage to depend on the precarious presence of water as the means of enabling the male sexual cell to find the female, and we find that the motile antherozoids are replaced by quiescent male cells, which are conducted to the female organs along a tube—the pollen-tube—which is a direct outgrowth of the spore or pollen-grain.

Now the gymnosperms, whilst they share with the rest of the flowering plants many characters in common, including the possession of a pollen-tube, yet differ from them in other important respects and approximate more nearly to the higher cryptogams. It is to the brilliant work of Hofmeister, more than forty years ago, that the recognition of this fact is primarily due, and it is, perhaps, a matter for surprise that a group occupying such an admittedly important position should not have been long ago subjected to a more searching scrutiny than it has received. It is true that Strasburger has added much to our knowledge; but, perhaps, the first really illuminating discovery since Hofmeister's time was that made by Belajeff in 1891, which was confirmed and extended by Strasburger in the following year. It was there shown that, whereas the similarity between the female prothallium and its products with the corresponding structures in cryptogams had already been recognised, a closer investigation into the process of germination of the pollen-grain also yielded quite unlooked-for resemblances to the homologous stages in the lower plants, clearly confirming the near kinship of the two groups.

But the presence of a pollen-tube, which would seem to render the formation of antherozoids superfluous, if not indeed directly disadvantageous, still appeared as one of the sharply-drawn distinctions between the zoidogamous cryptogam and the siphonogamous phanerogam. It is in the successful bridging over of this gulf that the great importance of the new discovery lies.

The two gymnosperms, *Cycas revoluta* and *Ginkgo biloba*, in which antherozoids have just been found, are both ancient types, and closely resemble each other in the mode of the formation of their male sexual cells. At first the pollen germinates much as in the other higher plants, forming a pollen-tube which penetrates the ovule, and containing a group of cells from one of which the antherozoids are ultimately derived. But unlike other forms which have been thoroughly investigated, the pollen-tube remains short, and although it may branch, it does not reach the archegonia in which the female cells are contained. The archegonia themselves lie round the base of a depression situated at the apex of the prothallium, and the space above them is stated to contain a

watery fluid. The two generative cells, which have travelled to the end of the rudimentary pollen-tube, now become differentiated into antherozoids. The nucleus, which is large and egg-shaped, lies enclosed in protoplasm, and the latter alone supplies the material for the formation of the coiled anterior portion of the body. Cilia are formed on the coil in great numbers, and are able to impart a progressive, rotatory motion to the antherozoid. Dr. Hirase, who studied their behaviour in *Ginkgo* while alive, was able to watch them actually moving, and probably the same is true of *Cycas*, although, owing to the material having been killed, this, of course, could not be tested in the case of the latter plant. They are large bodies, measuring about $82 \mu \times 49 \mu$, and escape from the end of the pollen-tube, reaching the necks of the archegonia by swimming through the intervening water.

In reading the short account, as yet published, there is a point of especial interest which strikes one, namely, that the plant must have already begun to eliminate the element of risk which a dependence on a mere chance supply of water entails, by itself secreting the liquid necessary to enable the antherozoid to accomplish its mission. As soon as this habit has been developed it becomes intelligible how, in these more primitive examples, the spore might proceed to swell and finally put out a protuberance on the side nearest the water-supply. And the more effectively this was carried through, the less would be the chance of missing fertilisation. Thus it becomes comparatively easy to reconstruct, at any rate theoretically, the transitional stages between zoidogamy and siphonogamy.

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HUMAN INCUBATORS.

IN a recent number of *L'Illustration* an account is given of an incubator used for rearing delicate children. The apparatus designed by Dr. Tarnier, Professor of the Faculté de Paris, was first used, in the year 1880, at the Paris Maternity Hospital: it is constructed on the same principles as the incubator used for hatching the eggs of poultry.

The apparatus, as first designed, consists of a large cubical box of thick wood, standing on a pedestal. This box is divided into two compartments, of which the lower contains a reservoir of hot water, and the upper the bed of the infant. A movable glass shutter forms the top of the apparatus, through which it is possible to observe the changes occurring inside, and take the readings of the thermometer placed near the infant. One side of the compartment is so hinged as to open like a door. The whole of the upper part is warmed by means of the hot water underneath, the warm air rising through holes at each end of the bed, and escaping through orifices situated at the top. The temperature of the water is so regulated that the temperature of the apparatus never exceeds 30° to 37° Centigrade. The weaker the infant is, the greater the temperature required.

Dr. Tarnier, with the help of his house surgeon, M. Auvard, lost no time in improving this apparatus. His latest design does not differ very much from the one described above; it has, however, the advantage of being more simple in character, and also lighter in construction. (Fig. 1.) The external dimensions measure $65 \times 30 \times 50$ centimetres, the thickness of sides being about 25 millimetres. The upper part of the case is divided into two sections, one being a wooden fixture, L, about 13 centimetres wide, and having a circular opening 4 centimetres in diameter at its middle part, to which may be attached a small helix, H. The rotation of this helix indicates the existence of a draught of air through the case. The other section is a glass shutter, V, which also serves as door.

The interior of the case is divided into a lower and

upper compartment by means of a shelf, D, extending almost across. The circulation of the air is as follows: air from the outside penetrates into the lower compartment through an opening, T, in the side; it acquires there a suitable temperature from the heaters, M,

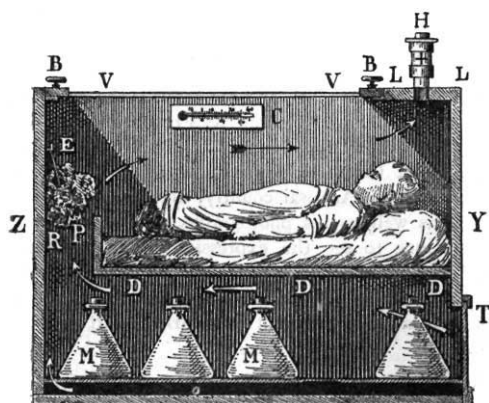


FIG. 1.—Dr. Tarnier's New Apparatus.

and rises into the upper compartment, moisture being obtained by its passage through a wet sponge, E. These heaters are capable of holding three-quarters of a pint of water. Five of these can be used at one time in the apparatus; but four are found sufficient to maintain the required temperature of 31° to 32° , provided the room is not less than 16° .

The infant is generally kept in the incubator from seven to fourteen days. This is about the *average* time, but it varies considerably, and cases have been known when the period has been extended to five weeks. The child may be taken from the incubator every two hours to be fed; but it must only be exposed to the air as short a time as possible, and care must be taken that the room is of a suitable temperature.

It is of interest to notice the decrease of mortality. The usual percentage of deaths of infants under 2000 grammes is 66 per cent., but by the use of the incubator this high figure is reduced to 36 per cent. Of those children born prematurely, few only survive; whereas it is now possible to save about 45 per cent.

While great care is taken to help to maintain the heat of the body of the child, it is also necessary to allow its system to renew that heat. If, therefore, the child is not strong enough to take food, some means must be taken of injecting it. In this case a probe, consisting of an india-rubber tube, with a graduated glass funnel at the end, is used. This instrument is inserted in the mouth, and pushed gently down the throat, and going a distance of fifteen centimetres, reaches the stomach. The probe is pressed, and sends the milk into the funnel until a sufficient quantity has been administered, when it is rapidly removed to prevent the return of the fluid.

Judging from the accounts which have been published, the improved apparatus seems to be very successful.

NOTES

THE following remarks, abridged from an editorial in the February number of the *American Naturalist*, will be cordially supported by many men of science on this side of the Atlantic:—"While the primary object of the university is instruction, there are several reasons why original research is of more than incidental importance to its prosperity. The mastery of his subject, which is characteristic of the man who advances the knowledge

of it, is an essential of a good teacher. The belief in this truth is so general, that the teacher who is known as a discoverer will more successfully attract students to his classes than he who is not so known. But, apart from this, the general reputation of a school before the public is more surely affected by the research work that issues from its faculty, than the managing bodies of some of them seem willing to admit. We believe that those universities which permit of the production of original work by those of its professors who have proven themselves competent for it, are wise above those who do not do so. Those who load such men with teaching, so as to forbid such work, reduce their prosperity. The managers will be wise to preserve for these men sufficient leisure to enable them to advance the frontiers of the known, and thus to obtain juster views of things as they are, and to bring us ever nearer to a comprehension of the great laws, whose expressions it is their business to teach to the growing intelligences of the nation."

THE Société Industrielle du Nord de la France has awarded a gold medal to M. Moissan, in recognition of his scientific investigations.

THE Council of the Sanitary Institute have accepted an invitation from the City Council of Leeds, to hold a Sanitary Congress and Health Exhibition in that city in the month of September next.

ACTING under the provisions of a rule which empowers the annual election by the Committee of nine persons "of distinguished eminence in science, literature, the arts, or for public services," the Committee of the Athenæum Club have elected Dr. David Ferrier, F.R.S., Professor of Neuro-pathology at King's College, London, a member of the Club.

THE Council of the Society of Arts attended at Marlborough House on Tuesday, February 16, when his Royal Highness the Prince of Wales, K.G., President of the Society, presented the Albert Medal to Prof. David Edward Hughes, F.R.S., "in recognition of the services he has rendered to arts, manufactures, and commerce, by his numerous inventions in electricity and magnetism, especially the printing telegraph and the microphone."

THE new building for the South African Museum at Cape-town has now been completed, and fitted with the so called "Dresden cases," which are made entirely of glass and iron, and are believed to be absolutely dust-proof and air-tight. Under the superintendence of Mr. W. L. Sclater, the Director, the collections are in process of removal from their former quarters into the new building, which is expected to be opened to the public by March 1.

WE regret to record the following deaths of men of science abroad:—Dr. Timothée Rothen, Director of the International Telegraph Bureau at Berne, and author of numerous treatises on telegraphy and telephony.—Prof. Karl Theodor Weierstrass, Professor of Mathematics in the University of Berlin, and Foreign Member of the Royal Society.—Prof. M. Klimm, Professor of Hydraulics in the Polytechnikum at Budapest.

REFERRING to Mr. Evans's letter in last week's *NATURE*, upon immunity from stings of bees, Mr. T. A. Gerald Strickland sends us a note on a similar case. A bee-keeper, having accidentally upset a hive, was so badly stung that he was laid up for a few weeks, but afterwards the stings of the bees did not affect him, though before his involuntary inoculation they caused great pain and swelling. The accident happened some years ago, but the bee-keeper was still indifferent to stings last autumn.