and Devon. The Silurian rests transgressively on Ordovician and pre-Cambrian rocks in Pembrokeshire, but is covered by a continuous series up into the Old Red Sandstone and Carboniferous; similarly the Morte Slates, which the author regards as the oldest rocks of North Devon, and in which he has recently found *Lingulella Davisii*, are covered by the Devonian and Culm series of rocks. Mr. Ussher described the occurrence of a volcanic series in the Lower Devonian rocks of Tor Cross, and traced similar diabasic rocks amongst the chloritic series of Prawle Point, the excessive alteration of these rocks being due to the greater nearness to the old resisting rocks of the Channel. In this conclusion he was supported by Mr. Hunt, who described the occurrence of detrital tourmaline in the Devonian cliffs at the north-east end of Straiton Sands, and compared it with the occurrence of similar material in a quartz-schist west of the Start Lighthouse. Both schists and sandstone contain detrital tourmaline, mica, fine-grained quartz, and iron.

Several palæontological papers were contributed. Mr. Montagu Browne exhibited teeth, scales, and bones of Colobodus from Aust, Watchet, and Leicestershire, which seemed to indicate the identity of Colobodus with Lepidotus, and possibly of Heterolepidotus with Eugnathus, and to give Colobodus an extended upward range. Mr. Buckman gave an account of the Ammonite zones in the Inferior Oolite. There is a marked break on the Continent between the *Murchisonæ* and the *Sowerbyi* zones, which appears to be filled up by the zone of *Lioceras concavum* in England. The *Sowerbyi* zone, however, is absent in England from all localities except Dundry, and Coombe near Sherborne; and the author therefore sought and obtained a grant to open an old quarry at the latter locality, in order to fully investigate the fauna of the *Sowerbyi* zone, and its relationship to the *concavum* and *Sauzei* zones. Mr. Storrie, of the Cardiff Museum, exhibited a fine series of slides and drawings of *Pachytheca* and *Nematophycus*, and gave a minute description of them; this elicited some discussion, in the course of which Mr. Murray suggested that the former might possibly be the egg of a Crustacean or some other small organic body completely incrusted by a Nullipore. Mr. Smith Woodward exhibited Pterodactyl and Plesiosaur bones from Brazil, and gave an account of a series of Miocene fish-remains from Sardinia. Other palæontological papers were one containing a record of the occurrence of a variety of *Estheria minuta* in the Lower Keuper building-stone of Chester, by Mr. De Rance, and one by Mr. Vine on the Bryozoa of the Upper Chalk. Mr. B. Thompson gave an exhaustive report of the transition bed between the Middle and Upper Lias in Northamptonshire, from which he had obtained a large and valuable series of fossils. Mr. Newton described the occurrence of *Ammonites jurensis* in the Northampton sands, near Northampton; and Prof. Hoyes Panton gave an account of a mastodon of very large size at Highgate, Ontario, and a mammoth from Shelburne, in the same province.

The occurrence of a strip of Lower Greensand four to five miles long between Shaftesbury and Child Okeford, and running parallel to the valley of the Stour, was described by Mr. Jukes Browne. The same author attempted to explain monoclinal flexure by the recurrence of movement in rocks already faulted, but covered subsequently by unconformable strata; movement along the faults of the older series, under the influence of new pressure, would throw the overlying series into monoclinal folds or faults. The existence of a large area of Kellaways rock, near Bedford, and the extension of Fuller's-earth works at Woburn were commented on by Mr. Cameron.

Several of the Committees appointed last year had done good work. The Photograph Committee had obtained over 250 new photographs of geological interest, many of which were exhibited in the Section-room or at one of the *soirées*, where also Prof. Wright displayed a fine series of transparencies illustrating the lava and glacial deposits of the United States, and Mr. Stirrup a set of slides of the dolomite district of Languedoc. The Earth-Tremor Committee had been testing a number of recording-instruments; Mr. Smith Woodward reported that the lists of type specimens were progressing, and that many large Museums were publishing their own lists of types; Mr. De Rance gave an account of a number of wells in Yorkshire, Lincolnshire, Notts, Cheshire, Shropshire, and Glamorganshire; and Mr. Johnston-Lavis sent a description of the Vesuvian eruption of 1890–91, the chief part of which has already appeared in the columns of NATURE.

BIOLOGY AT THE BRITISH ASSOCIATION.

THE papers read at this Section were fully as interesting, though not quite so numerous, as usual. A good deal of time on one day was occupied by a discussion upon animals and plants; but as several of those who took part in the discussion did not wish their remarks to be reported, it has been thought better to leave out this part of the proceedings of Section D. Botanical papers preponderated over zoological, but it was not found necessary to divide the Section into two sub-Sections.

Mr. Grenfell read a paper upon the structure of Diatoms, describing pseudopodia in these organisms. The pseudopodia are quite easy to see in such a form as *Melosira* with even a comparatively low power. They are very long and stiff, radiating outwards from the periphery, and are apparently non-retractile (they were watched for an hour without any movements being observed); the pseudopodia are sometimes nine times the length of the diameter of the Diatom, and are occasionally branched; adjacent Diatoms were sometimes seen to be connected by a fusion of their pseudopodia. It was suggested that the use of the pseudopodia is to keep the plants floating, and to act as a protective *cheveux de frise* against their enemies. These Diatoms were compared to Heliozoa, with which they have evidently not a little resemblance in the form of the pseudopodia. Incidentally Mr. Grenfell stated that he had found a coating of cellulose upon the green corpuscles of *Archerina*, which were regarded by Lankester as chlorophyll bodies, and not as symbiotic algæ.

Mr. Wager described the presence of nuclei in Bacteria; they were met with in a species of *Bacillus* found in water containing decaying *Spirogyra*.

Dr. Gilson read a paper upon the nephridia of the leech, *Nephelis*. The ciliated funnels appear to lose their connection with the rest of the nephridium, and to perform the function of organs for the propulsion of the blood along the channels in which they lie.

The Plymouth Zoological Station sent a record of work done during the last year by the Director and by Mr. Cunningham.

Mr. Calderwood read a paper upon some economical investigations which had been carried out. He stated that three investigations had been started within the present year, which it was hoped would prove of great value to the fishing population of this country. One was an attempt to produce an artificial bait for use in long line fishing. This investigation was being carried on by a competent chemist, and a considerable advance had already been made towards a satisfactory solution of this difficult problem. Inquiries were also being conducted with regard to the occurrence of anchovies on the south-west coast of England, and Mr. Cunningham, the Naturalist of the Association, had carried out some inquiries at fishing stations on the south coast. At present no net small enough in the mesh to capture anchovies was employed, but that fish appeared so often when the ordinary pilchard nets became entangled, as to suggest that they might be present in considerable quantities. Anchovy nets had, therefore, been constructed, and would be used during the pilchard season this autumn. An investigation was also being carried on into the condition of the North Sea fisheries, which were declared to be rapidly declining. It was proposed to draw up a history of the North Sea trawling grounds, comparing their present condition with their condition some twenty or thirty years ago, when comparatively few boats were at work; to continue, verify, and extend observations as to the average sizes at which prime fish, such as soles, turbot, and brill, become sexually mature, and to collect statistics as to the sizes of all fish captured in the vicinity of the Dogger Bank and the region lying to the eastward, so that the number of immature fish annually captured may be estimated. Also to make experiments with beam trawl nets of various meshes with a view to determine the relation, if any, between the size of mesh and the size of fish taken. Mr. Calderwood added that a regular survey of the English Channel had been commenced, not only in the deep water, but in various estuaries. A meteorological station of the second order had been recently established, where observations at 9 a.m. and 9 p.m. would be taken daily by wet and dry bulb thermometers, barometers, rain-gauges, and sunshine-recorders.

Mr. J. T. Cunningham read a paper upon the reproduction of the pilchard. The ovum of this fish, described as such in the Journal of the Association for 1889, was stated by Pouchet

not to belong to the pilchard; Pouchet believed that the pilchard's ovum is not pelagic. The identification of the ovum was shown to be correct by further observations carried out in the Laboratory with the ova obtained from the mature fish. Similar results have been obtained by Marion, of Marseilles.

Another paper, by the same, dealt with the growth of food-fishes, and their distribution at different ages.

(1) *Rate of Growth and Age of Sexual Maturity.*—Numerous specimens of the flounder (*Pl. flesus*) were reared from the larval state in the aquarium of the Plymouth Laboratory. Measured in April, when a year old, they varied from 4 to 19 cm. (about 1½ to 7½ inches). Specimens obtained in the Cattewater, and known to be not less than a year old, are from 12 to 19 cm. in length. None of these captive flounders, nor any taken in the Cattewater, were sexually mature, but, according to Dr. Fulton, of the Scottish Fishery Board, sexually mature flounders have been observed which were only 7 inches long. It was concluded, therefore, that (*a*) the rate of growth varies greatly for different individuals, but its maximum for the first year is 19 cm., or 7½ inches; (*b*) sexual maturity is not reached till the end of the second year, although the minimum size of sexually mature individuals may be slightly exceeded by some specimens in one year's growth.

Similar results were obtained for the plaice (*Pl. platessa*) and the dab (*Pl. limanda*).

(2) *Distribution.*—The young of the above-mentioned species in their first year, and of certain round fish, especially *Gadus luscus* and *G. minutus*, occur in shallow water, within the 10-fathom line. But there has hitherto been considerable difficulty in obtaining young specimens of other more valuable species in order to study their rate of growth. These species—namely, the sole, turbot, brill, lemon sole, megrim (*Arnoglossus megastoma*), do not pass the first year of their lives in shallow water. Young soles in the larval state occur in tidal pools at Mevagissey, and young turbot and brill 2 to 3 cm. in length are commonly found from June to August in Plymouth Sound and Sutton Pool, swimming at the surface in a semi-metamorphosed stage. Soles a little over 16 cm. in length are frequently taken in Plymouth Sound in summer; these are just over one year old, and are not sexually mature. Turbot 23 to 34 cm. long may be taken in 5 to 7 fathoms; these also are over one year old and not sexually mature. But the young stages between 3 months and 12 months old have not been taken in shallow water, and apparently live at depths greater than 10 fathoms. It seems that our commoner and more valuable food-fishes do not attain to sexual maturity till the end of their second year, that their size at this age is subject to great individual variation, and that the young in the first year of growth have a characteristic distribution. Investigation of the deeper water from this point of view is now being carried on at Plymouth.

The distribution of *Crystallogobius Nilssoni* was recorded by the same author. It had been found by Collett in the Christiania Fjord and in other parts of Norway; also at Bohuslan, in Sweden. Mr. Cunningham dredged 100 specimens at a single haul close to the Eddystone, in 27 fathoms of water. Day mentions only one specimen found in British waters—one taken by Thomas Edwards in a rock pool at Banff. Mr. Holt subsequently dredged a number in 30 fathoms in Ballinskelligs Bay. The species is probably fairly abundant between 20 and 30 fathoms on smooth sandy ground all along the British and Irish coasts.

Mr. Cunningham also read a paper upon the larvæ of the sea crayfish (*Palinurus vulgaris*), describing most of the stages, and particularly remarking upon the presence of the first maxillipede in the newly hatched larva, which had been stated by Richter to be absent.

Prof. Herdman and Mr. J. A. Clubb communicated a paper upon the innervation of the epipodial processes of some Nudibranchiate Mollusca. The cerata of the Nudibranchs were regarded by Prof. Herdman as being probably epipodial outgrowths.

The question has, however, been raised lately by Pelseneer and others as to whether the so-called epipodia of Mollusca are all homologous structures, and one of the subjects of controversy now is the origin of the nerve supply in various forms, it being supposed that where the processes are innervated from the pleural ganglia they are pallial in their nature, and where supplied from the pedal ganglia they are to be regarded as outgrowths from the foot.

Consequently it seemed of importance to determine afresh the origin of the nerves supplying the cerata in several different types of Nudibranchiata, especially as the results of former investigations, depending entirely, we believe, upon minute dissection, are puzzling, and to some extent contradictory. We have traced the nerves from the ganglia, by means of serial sections, in representatives of the genera *Polycera*, *Ancula*, *Tritonia*, *Dendronotus*, and *Eolis*, with the following results:—

In *Polycera quadrilineata* the cerebral and pleural ganglia are completely fused to form a cerebro-pleural mass. The "epipodial" nerves are found arising from the ventral and posterior part of this mass (*i.e.* distinctly from the pleural ganglia), and they run along the sides of the back to supply the ceratal ridges.

In *Ancula cristata* the pleural ganglia are fairly distinct from the cerebral. In a specimen cut into about 500 sections we find in the 100th section or so from the anterior end six distinct ganglia (the cerebral, pleural, and pedal pairs) surrounding the œsophagus. A few sections further back, the cerebrals disappear, and then the epipodial nerves are found arising from the dorsal edge of the pleural ganglia. The nerves soon turn posteriorly, and then give off their first branches dorsally. These branches enter the mesoderm of the body wall, and can then be traced back through over a hundred sections to the first pair of cerata, which they enter. The main nerve passes back to the remaining cerata.

In *Tritonia* and *Dendronotus* also the epipodial nerves arise from the pleural ganglia; but in *Eolis* (or *Facelina*) *coronata* we find that the main nerves to the cerata arise distinctly from the pedal ganglia. We have also traced in the same series of sections the ordinary pedal nerves to the foot proper; so there can be no question as to the nature of the ganglia from which the nerves arise. The epipodial nerves spring from about the middle of the pedal ganglion, rather on the dorsal surface, and, after a short course, pass through the muscular layer of the body wall and are distributed to the clumps of cerata.

But, in addition to these main epipodial nerves in *Eolis*, we find also a nerve arising from the compound ganglionic mass, immediately ventral to the eye (probably, therefore, from the pleural element), which goes to the front cerata. This pleural nerve has its origin distinctly anterior to the origin of the main epipodial nerves from the pedal ganglia.

We arrive, then, at the curious result that the innervation of the ceratal processes is not the same in all these Nudibranchs. In *Polycera*, *Ancula*, *Tritonia*, and *Dendronotus*, the epipodial nerves arise from pleural ganglia, or from the ventral and posterior parts of cerebro-pleural masses; while in *Eolis* the chief epipodial nerves are from the pedal ganglia, but there are also smaller nerves from the pleurals. In the ordinary Rhipidoglossate Gastropod, such as *Trochus*, the epipodial ridges and processes are supplied, according to Pelseneer, by nerves arising from the dorsal part of the elongated pedal ganglia. So, judging from the nerve supply alone, it might be said that the cerata of *Eolis* are pedal in their nature, and homologous with the epipodial processes of *Trochus*, while those of *Ancula* and the rest are totally distinct structures of pallial origin. But these dorso-lateral processes in the various Nudibranchs are so much alike in their relations, and are connected by such series of gradations, that it is difficult to believe that they are not all homologous; and the presence of the accessory epipodial nerve in *Eolis* arising from the pleural ganglion suggests the possibility of another explanation, viz. that these outgrowths, starting at first as pedal structures innervated by nerves from the pedal ganglia, may have acquired, possibly as the result of having moved further up the sides of the body, a supplementary nerve supply from the adjacent integumentary nerves arising from the pleural ganglia, and this supplementary supply, while remaining subordinary in *Eolis*, may in the other types have gradually come to supplant the original epipodial nerves, which are now no longer found in such forms as *Polycera* and *Ancula*. This is at present only a suggestion, which may be disproved or supported by the examination of the nerves of a number of additional Nudibranchs.

Prof. W. N. Parker read a paper containing the results of some experiments on respiration in the tadpoles of the common frog. After referring to the great power of adaptation to external conditions seen amongst amphibious larvæ, the author described some experiments on frog tadpoles, which, although not yet complete, show as follows:—(1) Soon after the lungs become functional—*i.e.* in tadpoles measuring more than 2 cm.

in length—the gills are no longer sufficient for purposes of respiration, and the animals die in a very short time if prevented from coming to the surface to breathe. (2) If tadpoles are prevented from using their lungs from an earlier stage onwards, the gills remain perfectly functional, and development proceeds as usual. At metamorphosis, the fore-limbs are slow in becoming free, owing to the retention of the operculum, that on the same side as the spiracle appearing first. Eventually, a slit-like spiracle is present on either side. In respiration, the mouth is opened and closed, as in the tadpole. Specimens of branchiate frogs were exhibited, in which the tail had shrunk to less than half its original length.

Exhibition of, and remarks upon, some young specimens of *Echidna aculeata*, by Prof. W. N. Parker. The specimens are from the collection of the late Prof. W. K. Parker, who received them from Dr. E. P. Ramsay, Curator of the Australian Museum, Sydney. They are much curved towards the ventral side, the snout pointing backwards, and the tail, in the older of the two stages, forwards. The younger stage measures along the dorsal curve, from the end of the snout to the tip of the tail, 12 cm., the greatest diameter of the body being 3 cm.; the corresponding measurements of the older stage are respectively 21·5 cm. and 6 cm. In the latter, the body is covered with short scattered bristles. In both stages the snout is very similar in form to that of *Ornithorhynchus*, and is covered by a thick horny layer, but in other respects the specialization characteristic of *Echidna* is already apparent. The gape is narrow, and extends only a short distance down the snout, and the manus, even in the younger stage, is already much larger and stronger than the pes. The tail is short and conical. There is no caruncle, or "egg-breaker," in the snout, such as is seen in *Ornithorhynchus*. A few points in the structure of the fore-part of the head in the older stage were described. The mouth has the narrow and tubular form seen in the adult, and the long tongue has a horny tip. The glands in relation with the mouth and nose are very numerous. There is no trace of any teeth-rudiments, and in many other respects the structure of the head shows extreme specialization. Jacobson's organ is large, and highly developed. A well-marked "turbinal" is present in it.

Prof. Howes read a paper upon the classification of fishes by their reproductive organs. On comparison of the urino-genital organs of those Osteichthyes having a non-abbreviated kidney with the same organs of the higher Vertebrata and the Elasmobranchs, the female genital duct and the kidney are seen to be inversely proportionate in length. No feature more fully characterizes the development of the Müllerian duct than the accompanying abbreviation of the kidney and the disappearance of its head segment. The persistence of the last-named among the Osteichthyes, and its possible retention of the renal function in rare cases, taken in conjunction with the mode of development of the ovary duct in these fishes, point to the conclusion that the latter is in no way homologous with the Müllerian duct as ordinarily understood. Balfour's belief that the genital ducts are homologous in both sexes of the Teleosteans, is supported by the facts of anatomy; and comparison of the reproductive system of the Ganoids with that of the Teleosteans shows the two to be modifications of the same common type; and the absolute structural community of the parts in the males and females of the Sturiones, while further confirming Balfour's doctrine, is opposed to Jungersen's implication that the subtle differences in the mode of development of the ducts in the opposite sexes of the Teleostei, are indicative of their non-homology. The facts above alluded to justify us in regarding the genital ducts of the Osteichthyes, not only as homologous in the two sexes, and primarily independent of the genital glands, but as distinct structures *sui generis*, probably unrepresented in all other Vertebrates. The Plagiostomi and Holocephali, in which vasa efferentia are present and the kidney becomes an accessory to reproduction in the male, may be grouped together into a *Nephrorchidic Series*, as distinguished from an *Enthorchidic Series*, embracing the Ganoids and Teleosteans. Comparison of the pori genitales in relation to the coalesced ureters of the Marsipobranchii with the corresponding parts of the females of those Teleostei destitute of genital ducts, especially in consideration of the facts concerning the development of the parts recorded by Scott, Liszt, and others, supports Rathke's conclusion that the ancestors of the former fishes must have possessed genital ducts. The Osteichthyes, although specialized in respect to many features of their organization, have, together with the Marsipobranchs, retained the least modified type of urinogenital organs known for living Vertebrates. W. N. Parker's recent and important discovery that, while in *Protopterus* a Müllerian duct is present, vasa efferentia are absent, and the testicular products are discharged through a duct more nearly comparable to that of the bony fishes than to the genital ducts of any other Vertebrates, suggests that the development of vasa efferentia and the assumption of a genital function by the Wolffian duct may have been effected subsequently to the formation of the Müllerian oviduct. And further comparison of the Dipnoi with the Elasmobranchii suggests that the former may have struck off from the Holocephalic branch of the latter before the differentiation of the ancestors of its living members.

Another paper by Prof. Howes dealt with the customary methods of describing the gills of fishes. The gills of Plagiostomes and Marsipobranchs are not unfrequently enumerated in relation to the opposite walls of the visceral sacs which give origin to them, while those of the higher fishes are enumerated in relation to the opposite faces of the septa which bear them. The confusion arising out of this is well known to teachers, and is, in itself, sufficient to justify the introduction of a revised nomenclature for the parts concerned. The facts of development show: (1) [on the assumption that the mandibular or mouth cavity is serially homologous with a pair of post-oral visceral clefts] that each gill lies in front of its corresponding skeletal arch; (2) that the saccular type of gill met with in the Marsipobranchs and Plagiostomes is that from which the pectinate one of the higher gnathostomatous fishes has been derived; and (3) that a mandibular gill has no existence in living fishes. Gills of the Marsipobranch-Plagiostome type may be conveniently described for general anatomical purposes, as *Cystobranchiæ*, and those of the higher Telosteoid type, as *Pectinobranchiæ;* while the parts of the individual gills themselves should be in all cases enumerated in relation to the visceral pouches from which they arise. Thus, the spiracular gill of Elasmobranchs (often termed the mandibular pseudobranch) should be described as the hyoid hemibranch, and the opercular gill of the higher fishes (often termed the hyoid pseudobranch) as the first branchial hemibranch. The well-known series of buccal filaments met with in certain Chelonia appear to have the fundamental relationships of gill-folios, and, in view of the discovery of Dohrn and others that the buccal sac would appear, from its mode of development in the Teleostei, to be the morphological equivalent of a pair of gill pouches, the possibility that these filaments may (at any rate for the most part) represent mandibular gills of a reversional character must not be overlooked.

Dr. Arthur Robinson communicated some facts relative to the development of the rat and the mouse. The most important part of the paper dealt with the relation of the yolk sac to the maternal tissues. The crypt in the uterine wall which lodges the ovum becomes shut off from the rest of the cavity of the uterus by a fusion between the distal proximal walls of the uterus. The greater part of the space so formed is occupied by the ovum; the remaining portions are converted into maternal blood sinuses; the blood in these sinuses bathes the trophoblast and the distal end of the yolk sac. Later, the distal part of the yolk cavity is obliterated by the apposition of its walls, but the proximal portion remains; diverticula grow out from from this into the placenta, which maintain the intimate relation of the yolk sac to the maternal blood. It seems probable, in view of these facts, that the yolk sac plays an important part in the nutrition of the fœtus. The allantois is a solid mass of mesoblast containing no diverticulum from the alimentary tract, and does not become attached to the trophoblast until comparatively late in the life of the embryo, *i.e.* the eleventh day.

Another paper by the same was entitled "Observations upon the Development of the Spinal Cord in *Mus musculus* and *Mus decumanus:* the Formation of the Septa and the Fissures." The anterior and posterior septa of the cord were stated to be formed by the spongioblasts of the cord itself, and not by ingrowths of the enveloping sheath of pia mater.

Prof. Marcus Hartog communicated an outline classification of sexual and allied modes of protoplasmic rejuvenescence.

I. The following modes of rejuvenescence occur in cellular and in certain apocytial organisms:—

A. PLASTOGAMY: the fusion of cytoplasta into a plasmodium, the nuclei remaining free.

B. KARYOGAMY: the union of cells (gametes), cytoplast to cytoplast and nucleus to nucleus, to form a 1-nucleate cell, the zygote. The following variations occur:—

1. ISOGAMY. The union of gametes undistinguishable in size, form, and behaviour; this may vary as follows:—

(*a*) MULTIPLE: between several gametes (up to 6).
(*b*) BINARY: between a pair of gametes;

or, from another point of view—

(*c*) INDIFFERENT: between any gametes of the species.
(*d*) EXOGAMOUS: between gametes of distinct broods only.
(*e*) ENDOGAMOUS: between gametes of the same brood only.

2. ANISOGAMY: the union of two gametes differing chiefly in size; the smaller (*micro-*) gamete is *male*, the larger (*mega-*) gamete, *female*.
3. HYPERANISOGAMY: the female gamete, at first active, comes to rest before fusion with the male.
4. OOGAMY: the female is never actively motile; the male is termed a *spermatozoön*, the female an *oosphere*.

From another point of view karyogamy is—

5. ZOOIDIOGAMOUS: one gamete at least is actively motile (flagellate, ciliate, or amœboid).
6. SIPHONOGAMOUS: karyogamy is effected by a tubular outgrowth from one or both of the gametes.

II. In apocytial fungi multinucleated masses of protoplasm (*gametoids*) may conjugate to form a *zygotoid*, by a siphonogamous process. The union may be *isogamous* or *anisogamous*.

III. Gametes may be classified as follows:—

A. According to their *formation*—

1. EUSCHIST: formed by repeated complete divisions from a parent cell, the gametogonium.

(*a*) EUTHYSCHIST: each nuclear division is accompanied by cell division.
(*b*) BRADYSCHIST: the nuclear divisions are completed before any cell division takes place.
(*c*) ISOSCHIST: the brood-cells of a gametogonium are all equal and functional.
(*d*) ANISOSCHIST: the brood-cells are unequal, some of them being reduced to aborted or degraded gametes.

2. HEMISCHIST: the divisions are limited to the nucleus, none occurring in the cytoplasm.
3. APOSCHIST: the cell divisions do not occur, but a cell directly assumes the behaviour of a gamete.
4. SYMPHYTIC: the gameto-nucleus is formed by the fusion of several nuclei.

B. According to their *behaviour*, as—

1. FACULTATIVE: retaining the power of development if karyogamy fails to occur.
2. OBLIGATORY: with no power of independent development.

IV. PARAGENESIS will include the following modes, usually grouped under the term parthenogenesis, apogamy (*pro parte*), &c.:—

A. TRUE PARTHENOGENESIS: the direct development of a facultative gamete without karyogamy. This may occur in the case of—

(1) Isogametes; (2) Anisogametes (male and female); (3) Oogametes.

B. SIMULATED PARTHENOGENESIS:—

1. CELLULAR: a cell assumes directly the behaviour of a zygote.
2. APOCYTIAL: a multinucleate mass of protoplasm assumes directly the behaviour of a zygotoid.

C. METAGAMETAL REJUVENESCENCE:—

1. UNICELLULAR: a single cell in the neighbourhood of the gamete assumes the form and behaviour of the zygote.
2. MULTICELLULAR: a mass of cells in the position where gametes should be produced, assumes the character of the young organism formed by the zygote.

D. PARAGAMY or ENDOKARYOGAMY: vegetative or gametal nuclei lying in a continuous mass of cytoplasm fuse to form a zygote nucleus.

1. Progamic paragamy: the fusing nuclei are the normal gametonuclei of the progamous cell (ovum which has formed 1-polar body).
2. Apocytial paragamy: the vegetative nuclei of an apocytium fuse to form a zygote nucleus.

The President of the Section read a paper by himself and Miss Dorothea Pertz, on the artificial production of rhythm in plants. The apparatus, devised by the Cambridge Scientific Instrument Company, was exhibited. The plant is subjected to a series of alternate and opposite influences from light or gravitation, as the case may be. The plant to be experimented with is fixed to a spindle, which, by a clockwork escapement, makes a sudden semi-revolution every half-hour. When the clockwork is stopped, the plant continues to curve with an acquired rhythm, as if the machinery were still in action. This is similar to certain natural rhythms—for instance, to the "sleep" of flowers, which for a short time continue to open and shut although kept constantly in the dark.

Prof. Green read a paper on the occurrence of diastase in pollen. The starch in the pollen grain serves as nutriment for the growing pollen tube, and the presence of the ferment converting it into sugar enables it to travel along the growing tube.

Prof. Vines, in a paper upon diastase in foliage leaves, controverts the opinion of Prof. Wortmann, who stated that diastase was either absent from the foliage leaves of plants, or present in such minute quantities that it could be of no physiological importance. It is this diastase, and not the protoplasm of the cells, which converts the starch accumulated in the leaves into sugar.

Canon Tristram exhibited and made remarks upon the smallest known species of parrot, of which the skin measured only two inches in length.

THE CONGRESS OF HYGIENE.

WE printed on August 20 (p. 303) an account of some of the work done in the Section of Preventive Medicine in the Congress of Hygiene. The following is the conclusion of our report:—

ALCOHOLISM.

Sir Dyce Duckworth, of London, opened a discussion on "The Relation of Alcoholism to Public Health and the methods to be adopted for its Prevention."

Prof. Harald Westergaard, of Copenhagen, followed with a paper on the same subject. What are the losses of life, he asked, caused to a population by intemperance? This question can to a certain extent be answered by examining the causes of death, especially delirium tremens and chronic alcoholism. It has been objected that these causes of death supply an unsatisfactory picture of drinking excess, because the wish to spare the feelings of surviving relatives makes returns of such deaths less trustworthy, and it has therefore been proposed to use other diseases as a measure—such as liver disease (especially cirrhosis of the liver). Yet it is worth while to examine the above-mentioned causes of death. In most countries the statistics of the cause of death do not allow conclusions with regard to alcoholism corresponding to those for Denmark and Norway. But, at all