cular subject and illustrates it from the observations and gatherings of the day. During the winter meetings are held for the reading of papers, many of which seem of considerable value. This Society was formed for the practical study of science, and on the whole this object appears to be well kept in view.

THE Cambridge Board of Natural Science Studies announce that applications by members of the University desirous of availing themselves of the facilities for study at the Zoological Station at Naples during the ensuing season, are to be sent to Mr. Foster, Trinity College, on or before the 20th of October.

AN appeal is made on behalf of the widow of the late Dr. Beke: that lady, it seems, having been left in very straitened circumstances. It is proposed to utilise the Beke Testimonial Fund for this purpose, and additional subscriptions are requested to be paid to Messrs. Cox, Biddulph, and Co., Charing Cross, or to Messrs. Robarts, Lubbock, and Co., Lombard Street.

WE would draw the special attention of our readers to an excellent new quarto work, abundantly and beautifully illustrated, on "The Marine Mammals of the North-western Coast of North America, together with an account of the American Whale-Fishery," by Capt. Charles M. Scammon. It is published at San Francisco by J. H. Carmany and Co. The figures of the characteristic attitudes of the different species of seals, as well as of the whales, in their native element and otherwise, are far superior to any we have ever seen, having all been evidently taken from the life. The volume is dedicated to the memory of Louis Agassiz.

PROF. SHALER has published a memoir upon the "Antiquity of the Caverns and Cavern Life of the Ohio Valley," in which he endeavours to show the period at which the animal life, so characteristic of Western caverns, received its first expression. He sums up his researches in the following propositions:—1. The extensive development of caverns in the Ohio Valley is probably a comparatively recent phenomenon, not dating further back than the latest Tertiary period. 2. It is doubtful whether there has been any extensive development of cavern life in this region before these caverns of the subcarboniferous limestone began to be excavated. 3. The general character of this cavern life points to the conclusion that it has been derived from the present fauna. 4. The glacial period, though it did not extend the ice-sheet over this cavern region, must have so profoundly affected the climatal conditions that the external life could not have held its place here in the shape we now find it, but must have been replaced by some Arctic assemblage of species. Under the circumstances, it is reasonable to suppose that most, if not all, the species found in these caves have been introduced since the glacial period. 5. We are also warranted by the facts in supposing that there is a continued infusion of "new blood" from the outer species taking place, some of the forms showing the stages of a continual transition from the outer to the inner form.

THE additions to the Zoological Society's Gardens during the past week include a Campbell's Monkey (*Cercopithecus campbelli*) from West Africa, presented by Capt. Damm; a Lesser White-nosed Monkey (*Cercopithecus petaurista*) from West Africa, presented by Mr. John Gordon; a Sloth Bear (*Melursus labiatus*) from Ceylon, presented by Mr. W. D. Wright; two Antarctic Skuas (*Lestris antarctica*) from the Kerguelen Islands, presented by the Rev. A. Eaton; a Proteus (*Proteus anguinus*) from the Adelsberg Caves, presented by Capt. R. F. Burton; a Persian Gazelle (*Gazella subgutturosa*), two Coatis (*Nasua nasica*), born in the Gardens; two Wapiti Deer (*Cervus canadensis*) from North America, an Ocelot (*Felis pardalis*) from South America, a Hoffmann's Sloth (*Cholopus hoffmanni*) from Panama, deposited.

ARCTIC MARINE VEGETATION

NOW that another expedition is about to sail for the Arctic regions through Davis's Straits, it is thought that some notice of the magnificent flora of the shores of Greenland may prove interesting. An essay on this subject,* written in Swedish, by Professor Agardh, the celebrated Swedish algologist, is now before me, but as it is too long for insertion in these pages, I will endeavour to condense as much of it as possible into an abstract.

During the Swedish Expedition to Greenland in 1870, a collection of Algæ was made on the Greenland coast, between Disco Island and Sukkertoppen, some degrees to the southward. These Algæ were afterwards examined by Professor Agardh, and in the essay above mentioned he gives us the result of his examinations, and some exceedingly interesting observations upon the characteristics of the marine flora of this Arctic district. It is not only the more or less numerous species which give to the marine vegetation in different zones a different character, but it is the abundance or scarceness of Algæ, their divarication in a greater or less degree from the common form and aspect, their great size, the multitude of individuals, and so on, which give a very variable appearance to the seaweed-grown shores of different seas.

As in the northern region of the pine-tree, there are but few species, while the masses of forest are formed of an immense number of individuals which grow near together; so with regard to the northern marine flora, the principal portion of which is found to possess a general character, consisting of a few similar species, but, as before mentioned, of an immense number of individuals. Nearest to high-water mark are the species of Fuci; below them are the Laminariæ (Tangles, or seaweeds); these crowd on every rock and stone, and to each of them is attached its peculiar parasitic species. Occasionally, other species, belonging to the northern marine flora, stray into calm bays, inclosed caverns, or are carried away by strong currents. Compared with the weed-covered shores of Southern Europe, the uniformity of aspect on these Arctic shores is very great, and the number of species occurring there fewer than those of our own coasts. The principal characteristic of the vegetation of the colder seas is the gigantic size of the species of which it is composed, and this is especially the case with regard to the northern Algæ. *Laminaria saccharina* and *L. digitata*, *Himanthalia*, *Alaria*, *Scytosiphon filum*, &c., on our own coast, give but a feeble indication of what the more Arctic regions in this respect exhibit. When it is known that the Mediterranean and warmer seas contain some few species which from their great size are never found in Herbaria, one can understand how difficult it must be to find specimens suitable for Herbaria among the Arctic species. Professor Agardh lays great stress upon the importance of collecting specimens of these plants in all stages of their growth, and points out the great similarity to each other of young plants of different species, which makes it extremely difficult to discriminate the different species in the young state. The numerous examples, of all ages, brought home by the Swedish expedition, and especially those laid down in salt, could thus be examined in a fresh state, and enough of them might be dissected for the more accurate determination of these large-growing species. As Professor Agardh has referred here to salting down the Algæ, it may be as well to mention that in another publication he has stated that the best way of preserving Algæ is by the following process. In a cask or other convenient vessel put a layer of salt, then a layer of Algæ; then another layer of salt, then another of Algæ, and so on until the cask is full. Algæ thus preserved are found to be almost as fresh as when first taken out of the sea.

If in the extreme north the phanerogamous flora is characterised by dwarf forms, so do forms of an opposite character prevail in the marine vegetation of the Arctic regions. To a certain degree the aspect of the magnificent Arctic marine vegetation depends upon the common large-growing Laminariæ, which constitute a considerable and characteristic portion of it. Laminariæ are also found in the Southern Ocean, and there are even other large Algæ, as, for example, the species of Iridæa, in the North Pacific, which have much larger dimensions in colder oceans than have analogous species in the warmer seas. So, also, the great number of species of Laminaria in the Arctic seas is an indication

* Bidrag till kännedomen af Grönlands Laminaricer och Fucaceer af J. G. Agardh, inlemnadt till K. Vet. Akad. den 27 Sep. 1871. (Stockholm, 1872, P. A. Norstedt and Söner.)

that if these prevail the number of other species is relatively less. While, on the other hand, only one species of Laminaria with an entire, and one with a laciniated frond, is found on the Swedish coast, there are on the coasts of Spitzbergen and Greenland at least five species of Laminaria. The *L. cuneifolia* of Greenland is about the same size as *L. saccharina;* but *L. longicruris*, one of the commonest Algæ of Greenland, is very large; the stalk, which is sometimes many ells * long, bears a lamina (frond) of equal size. Some specimens had been seen by Prof. Agardh, which, including both stem and frond, were eighty feet long. Ruprecht mentions an Alaria from the Sea of Okhotsk, the frond of which was about the same breadth as that of the common European form, which had a length of more than fifty feet. From Spitzbergen comes another species of this genus, whose frond is as much as one ell in length and about three ells long; and also another species several ells long, with a stem as thick as a finger. But it is especially in the north part of the Pacific, on the North American coast, that the richness of the Laminarian forms and their great size are most conspicuous. The species of Alaria, Arthrothamnus, Thalassiophyllum, Agarum, and Nereocystis together constitute such a magnificent marine flora, that one feels a difficulty in forming an idea of the smaller representatives of the same group which are found in other seas. *Nereocystis Lutkeana* has a stalk 270 feet in length, when it swells into a bladder that bears a tuft of fronds which are quite twenty-seven feet in length. In the Antarctic seas the analogues are to be found, the Durvillæa, and Lessonia of Cape Horn, Ecklonia of the South African coast, the species of Macrocystis, &c., are well-known examples of the large Algæ which are found there.

It is perhaps less surprising that a rich marine flora should appear on the coast of Spitzbergen wherever a considerable branch of the water of the Gulf Stream follows the coast, and in proportion receives a higher temperature and a greater degree of saltness. But in Greenland it may be otherwise. Cold currents are said to flow along the west coast of Greenland upwards, as well as on the opposite coast of America downwards.† During a considerable portion of the year the sea appears to be frozen along the coast, and even during the summer months drift ice is reported to be continually seen in the open sea. Under such conditions, although a marine vegetation of large size appears there, it may be assumed that an ice-cold or nearly ice-cold sea by no means prevents a great development of Algæ, where the other conditions necessary for their growth are found. One is tempted to believe that the great abundance and size of the marine flora on the coasts of the colder seas, on the one hand, and on the other the richness of the open seas in Diatomaceæ, are in some measure the cause of the abundance of animal life which prevails in these regions, and which, in the regularity of its limits, may afford a hint to the expeditions for carrying on the whale fishery that every year employs thousands of vessels. "It has been remarked," says Ruprecht, "that the northern boundary of the large sea animals is found where the coast is most bare of Algæ;" and Maury ("Physical Geography of the Sea") remarks on the superior flavour of fish from the colder waters, and the greater excellence of the principal fishery grounds of the world, which are all situated in the colder waters.

In direct opposition to what occurs on the Greenland and Spitzbergen coast, Ruprecht states that the whole coast of Behring's Sea north of the Aleutian Islands is almost entirely without marine vegetation; an astonishing statement, as not only on the Aleutian Isles, but also on the American coast to the south of them, the marine flora is rich and is developed on a grand scale. Ruprecht's statement that the whole Arctic sea of Siberia, eastward from the Gulf of Kara to Behring's Sound, is almost entirely without marine vegetation, is almost open to doubt, since Prof. Agardh possesses specimens of two Algæ in good preservation which were taken near the mouth of the Lena, and Ruprecht himself mentions another Alga which was found in Behring's Sea. Should it be ascertained that while the rocks of the Arctic Sea, wherever they have been examined, namely, in Norway, Spitzbergen, Greenland, and the coasts of America, present, through the number of individuals and their great size, a peculiar marine vegetation, while, on the other hand, eastward from the Gulf of Kara the sea should be found to be very poor as regards its flora, or even desitute of these large Algæ, perhaps one might under these circumstances form an opinion that the Baltic Sea was one of the former gulfs of the Arctic Ocean, and at a later period was separated from it; hence great interest attaches to the study of the Algæ of the Baltic Sea. The character of extraordinary scarcity of Algæ, which according to Ruprecht characterises the Arctic Ocean, also prevails in the Baltic Sea, where long ranges of rocks, broken like those of the Atlantic into bays, and apparently well adapted to harbour a rich vegetation, are entirely bare of vegetation, while the rocks and rock-pools on the western coast are crowded with Algæ. The stunted representatives of marine Algæ that most generally appear in the southern and western parts of the Baltic Sea may perhaps have come at a later period from the west, after the Baltic was united with the Atlantic.

More accurate information relative to the Algæ and their alleged scarcity in the Siberian Sea and Behring's Sound are still wanting, but *à priori* one is scarcely entitled to assume that the Algæ in these localities should differ materially from the uniform character of gigantic size which seems to distinguish the vegetation of the other Arctic Sea. On the other hand, that the Baltic Sea, as well in respect of the number of individuals as of their development, is in direct opposition to the vegetation in the other northern sea, is undeniable. But the Baltic Sea is in a peculiar state. It is an enclosed sea, into which large fresh-water rivers discharge themselves, and a freezing sea, ice-covered during a considerable part of the year, in a great degree prevents evaporation. Both these circumstances may cause the Baltic to be considered almost as a fresh-water basin, into which salt water flows from the sea almost entirely through the Kattegat and more south-westerly parts, and in the deep water retains some perceptible degree of salt. The influence of the salts on the growth of Algæ is at present but little understood, but that they have great influence cannot be doubted. The Algæ which appear in the Baltic cannot be said to indicate a high northern or north-eastern origin. They seem to be the Algæ of the Kattegat in a dwarf form. Some few species of Algæ appear to be peculiar; but in this case they do not prove that the Baltic was once a gulf of the Arctic Sea.

It has been already remarked that a scarcity of forms and abundance of individuals is a characteristic of the marine vegetation of the northern ocean. Nevertheless it must not be concluded from the scarcity of forms which prevails in every separate locality, and of which a few species of each constitute the principal masses of marine vegetation, that the same species prevail everywhere. We should then fall into the error of the older botanists, who thought that they recognised in foreign Algæ many well-known forms of the European flora, which outwardly bear a great resemblance to each other. With regard to the northern Laminariæ and Fucaceæ, it may yet be shown that there are analogous—if not identical—species, which appear in different localities, and that the species resembling each other in aspect, also in their *habitat* resemble each other, and thus constitute representative species. The circumstance that at first one does not perceive the difference between species bearing similar names from different localities, is but weak evidence of the identity of the forms which under the same names were supposed to prove that all these so-named European species actually appeared on the coast of Australia; although we might justly allege this fact as a proof of changes which might have broken the former connection between the seas, and so prevented migration from taking place at the present time. So soon as accurate examination is made, important variations are observed to exist between many species which pass under similar names, and some doubt may be entertained, not only whether they constitute entirely different species, but even whether they do not sometimes belong to entirely different genera.

Such representative species appear in many, and in perhaps most genera; but in Laminaria and Fucus there are some analogous forms which are very similar to the eye; there being in each genus two principal forms only, while each possesses many species which bear a great resemblance to each other. The similarity is, in reality, here so great that many were for a long time considered, and many more may probably even henceforth be considered, as modifications of the same species.

The difficulty of characterising the species of Laminaria is really very great, not only on account of the great resemblance between them, but also because the species change their aspect

* A Swedish ell is equal to two feet.—M. P. M.

† In the narrative of the North German Expedition it is stated that on the east coast of Shannon Island, lat. 75° 29′ N., drift-wood, identified as alder (*Alnus incana*, L.) and poplar (*P. tremula*, L.) was washed ashore, thus plainly showing that the drift-wood of N.E. Greenland comes originally from N. Siberia; whence, driven into the sea by the strong currents, it floats in a westerly direction north of Spitzbergen, and is carried on until it reaches Greenland, where it takes a southerly course. See vol. ii. p. 537.—M.P.M.

during different periods of their development, and this more frequently in an analogous manner. During the first period they are so like each other that it is almost impossible to separate one from the other the younger forms of the most dissimilar species. They all begin with a short stalk and an undivided frond (lamina); then the stalk continues short in some, and lengthens considerably in others; in some the lamina continues undivided; in others it is cloven. But it is especially to be observed that this lamina, whether undivided or cloven, is variable in most species. Thus, all are at first small and extended in length, with a more or less wedge-like base; but the wedge-like base becomes heart-shaped and even kidney-shaped in some; in others it retains a wedge-like form throughout its whole state of development. Most species periodically change their lamina; with the change the new lamina becomes larger and broader than the old one. The young lamina is thin; in colour rather inclining to green than to light brown; in different species the lamina is at a later period thinner or thicker, and with a different tint of colour. The fructification appears in different species not only in different parts of the lamina, but the sori extend in different directions, although they do not seem to assume precise forms. The characteristics of species must therefore be judged, not from the peculiarities of appearance, but by the whole development of the plant, the differences of which are with difficulty comprehended, unless the species throughout their whole range of growth be accurately compared with each other. Considering that certain characteristics are scarcely perceptible except when the plants are in fresh condition, and that collectors are contented with preserving portions or incomplete specimens only, we cannot wonder that the species of Laminaria should be confounded with each other.

Greville had named a Laminaria from the coast of Africa, *L. pallida*, from a modification in its colour. Younger forms, in which the colour was less evident, or the lamina not yet cloven, were referred by many algologists sometimes to *L. digitata*, sometimes to *L. saccharina*. But between these northern species and that of the Cape, lies an ocean which it is difficult for a Laminaria to pass. Although the characters which separate *L. pallida* and *L digitata* are not more important than those which separate *L. digitata* from *L. stenophylla*, it must, nevertheless, be considered that *L. pallida* is a distinct species.

L. longicruris is the most common as well as the largest of the Greenland Laminariæ. It is the representative on their coast of *L. caperata*, a native of Spitzbergen, no specimens of which have been seen from Greenland, neither has *L. longicruris* yet been found at Spitzbergen. From Greenland *L. longicruris* spreads down the American coast as far at least as the forty-second parallel, and one specimen is reported from the Bahamas. Portions of this species have been cast ashore on the coasts of Norway, Ireland, and Scotland. In Gunner's "Flora Norvegica," a form is mentioned under the name of *Ulva maxima*, which Agardh considers to be *L. caperata;* the same form has also been found on the north coast of Scotland.

The Berggren collection also contained a great number of examples of Laminaria that, by Dickie (Algæ from Cumberland Sound, in Linn. Soc. Journ. vol. ix. p. 237) and by Croall (in Brown's "Flora Discoana," Trans. Bot. Soc. Edinb. p. 459), was called *L. saccharina*. Prof. Agardh considers the above-mentioned plant as identical with his *L. cuneifolia*. He states that he has never seen a specimen from Greenland of *L saccharina* as it appears on our coast. *L. cuneifolia* is an example of a species which is found near Greenland and also in the northern part of the Pacific. The Alga described by Ruprecht under the name of *L. saccharina v. lessoniæfolia* may be a smaller form of the same species. Specimens from Newfoundland and Scotland have been seen, which may belong to the same species. *

Of *L. solidungula* there are specimens from Ritterbank and Jakobshavn. This species seems to have a wide range in the Arctic sea, appearing at Spitzbergen, Greenland, and in the northern parts of the Pacific, if, under this species, is to be accepted some specimens with disciform roots described by Ruprecht.

In the same collection is a new species with laciniated frond, named *L. atro-fulva* from its dark colour, which distinguishes it from every other species, in all stages of its growth. Excepting *L nigripes*, it is the only Laminaria from Greenland with a laciniated frond. Neither Dickie nor Croall mentions it in their lists of Algæ. In a note to the Flora Discoana it is mentioned that in another collection *L. digitata* was found. From such a statement one may, nevertheless, be unable to determine which Laminaria with laciniated lamina was here referred to. That *L. digitata*, so common on the European and Spitzbergen coasts, should not be found in Greenland was so much the more singular, that it was thought to be common at Newfoundland, and is stated by Harvey to appear on the American coast as far south as Cape Cod. Postel and Ruprecht also mention it as existing in the North Pacific, but perhaps the specimens seen belong to other species. *L. Bongardiana*, with which *L. atro-fulva* most nearly agrees, is said to have a canaliculated stem, by which it is easily separated from the Greenland species.

Of *L. dermatodea* there is only one specimen in this collection. It is probably rare in Greenland. This species is found at Newfoundland, Spitzbergen, and Norway.

L. Fascia is included in the Berggren collection, but is not met with at Spitzbergen.*

A Greenland specimen, called *Scytosiphon filum*, was in a state of preservation too imperfect to be determined.

The most beautiful and characteristic species of the Greenland marine flora are, undoubtedly, those of Agarum, a genus which belongs also to the northern part of the Pacific. The Greenland species extend down the North American coast and that of Newfoundland, but not a fragment of this genus has as yet been found on the Spitzbergen and European coasts. It appears to be common in Greenland. The Greenland species vary in the breadth of the costa and the closeness of the holes with which the frond is pierced, but Agardh knows of no other difference, and refers all the specimens to one species, namely, *A. Turneri*.

Among the Laminariæ, included in the collection, few are of greater interest than the form of Alaria taken in Sukkertoppen in great abundance and of all ages. Hence Prof. Agardh has been able to characterise the different Greenland species of Alaria, which are as follow:—*A. esculenta*, *A. musæfolia*, *A. Pylaii*, *A. membranacea*, and *A. grandifolia*.

Next to the Laminariæ the Fucaceæ form the most considerable part of the Berggren collection. They consist chiefly of the more Arctic forms brought home from Spitzbergen, with some differences. Of the forms common on the north coast of Europe (*Fucodium canaliculatum*, *Fucus serratus*, *Halidrys siliquosa*) which have not been found on the coast of Newfoundland or America, there are not any examples in the Greenland collection. Of these, *F. serratus* only is found at Spitzbergen, but this differs from the true European form. With *F. serratus* may be compared *F. edentatus* of Newfoundland. *F. canaliculatum* was compared by Harvey with *F. fastigiatum* of California. Analogous species probably represent each other in different localities. Of *Fucodium nodosum*, some examples, taken from different localities, are found in the Greenland collection.

Fucus vesiculosus, so common along the European coast even up to the extreme north of Norway, is absent, or at least very scarce, at Spitzbergen, but is one of the commonest of the Greenland species. It is found there both with and without vesicles. Besides *F. vesiculosus*, the collection contains numerous examples of *F. evanescens*, J. Ag., *F. Miclonensis*, and *F. filiformis*, which grow together, and in the same locality as *F. vesiculosus*, which is distinguished from the others by its stout consistence and by its drier surface, while the others give out more mucus. It is also easy to separate extreme forms of *F. evanescens*, *F. Miclonensis*, and *F. filiformis*, but among the abundance of specimens brought from Greenland intermediate forms appear, so that it is often difficult to decide the boundary between these species. When extreme forms lie together, *F. filiformis*, so different in its aspect from *F. evanescens*, is without doubt much more nearly related to *F. evanescens* than to *F. distichus*, with which it has long been confounded and considered identical.

Among the Greenland collection is one which differs from any that Prof. Agardh had seen, but which agrees most nearly with *F. filiformis*, although it is separated by fixed characters from all the species previously received. The smallest forms come nearest to *F. balticus*, like that forming globular vesicles which probably float the plant with ease into deeper water. It has been named *F. divergens*.

The fact that the species of Fucus, more than those of various

* Near Walrus Island, lat. 74° N., great quantities of marine plants, chiefly consisting of a large Laminaria, were washed up by the ice and the tide, or were lying in hollows. See Narrative of North German Expedition, vol. ii. p. 518.—M. P. M.

*In the narrative of the German Arctic Expedition (vol. ii, p. 345) *L. Phyllitis* is stated to have been found all along the East Greenland coast among and under the ice. This is the first time I believe that this Alga has been reported from so high a latitude. It was accompanied by *Desmarestia aculeata*.—M. P. M.

other genera, appear to be formed upon a single type, contributes naturally to the common opinion that the genus has few but much-varying species. In describing the Greenland forms, Prof. Agardh has endeavoured to show that besides the difference in form, deviations also occur which ought to be retained as characteristics. In a preceding memoir he had stated that the differences noticed by other algologists in the antheridia and spores being formed in the same or in separate receptacles may possibly be explained thus: namely, that in different seasons the receptacles differ in this respect. Should such an explanation prove to be erroneous, it will undoubtedly be seen that it is these differences, more than others, that deserve to be considered as the characteristics of species.

The reader who wishes for further information relative to the species of Algæ inhabiting the Arctic seas is referred to the list of Arctic Algæ in Harvey's Ner. Bor. Americana, and to Dr. Dickie's List of Algæ obtained in Cumberland Sound (Journal of Linn. Soc. vol. ix.) Perhaps also some of the Algæ collected by Dr. Lyall on the north-west coast of America, thirty-two of which had not been found elsewhere, may extend to the Arctic Sea. See Harvey's List of Algæ, collected by Dr. Lyall, Journ. of Linn. Soc. vol. vi.

MARY P. MERRIFIELD.

SCIENTIFIC SERIALS

American Journal of Science and Arts, April.—The principal contents of this number are: The history of Young's discovery of his theory of colours, by Alfred M. Mayer. The aim of this paper is to give extracts from Newton, Young, and Wollaston, which embody the early literature of Young's celebrated theory of colour, and to furnish a history of the steps by which he was led to the adoption of what is now known as Young's theory of colour-sensation.—A re-determination of the constants of the law connecting the pitch of a sound with the duration of its residual sensation, by Alfred M. Mayer. This article refers to a previous article of October 1874 on the same subject. Since then, Madame Seiler (who assisted Helmholtz) and Dr. Carl Seiler have spent considerable time in re-determining the durations of the residual sonorous sensations, using Mr. Mayer's apparatus. From their experiments he has found the law given before as $D = \left(\frac{53248}{N + 23} + 24\right)$·0001 requires to be modified to $D = \frac{3'2}{N + 31} + $ ·0022, where $D =$ the durations of the residual sonorous sensation corresponding to N number of vibrations per second.—On the action of the less refrangible rays of light on silver, iodide, and bromide, by Carey Lea. The result of 160 very concordant experiments shows that AgBr and AgI are sensitive to all the visible rays of the spectrum. AgI is more sensitive than AgBr to all the less refrangible rays and also to white light. The sensitiveness of AgBr to the green rays was materially increased by the presence of free silver nitrate. AgBr and AgI together are more sensitive to both the green and the red rays than either AgI or AgBr separately.—On the Silurian age of the Southern Appalachians, by F. H. Bradley. First portion (to be continued).—Spectroscopic examination of gases from meteoric iron, by Arthur W. Wright. On the supposition that meteoric iron has received its hydrogen and other gases from the sun or some other body having a similar atmosphere of great density, it seemed probable that a spectroscopic examination might reveal the unknown gaseous elements assumed to be present in the solar corona. Only negative results were obtained. But the fact incidentally observed of the varying character of the oxygen and hydrogen lines in the presence of hydrogen, and the near coincidence of two of them with prominent coronal lines, with the possible coincidence of a third line, goes to show that the characteristic lines in the spectrum of the corona, so far from indicating the presence of otherwise unknown elements, are simply due to hydrogen and the gases of the air, oxygen and nitrogen.—On the duplicity of the principal star of Σ 1097, by S. W. Burnham.—The original notes under the head of Scientific Intelligence are: Progress of Geological Survey of Canada, 1873–74; the genera Opisthoptera (Meek, 1872) and Anomalodonta (Miller, 1874); the Gulf of Mexico in the Miocene time.

Der Naturforscher, Nos. 1 to 5, 1875.—This part contains many papers reprinted from other journals, besides several original contributions. We note the following:—On the physiological action of amyl nitrite and the causes of blushing; investigations made by Herr Wilhelm Filehne, who found that amyl nitrite acts upon that part of the brain which is also acted upon when the individual has the feeling of shame and blushes. The most interesting part of the paper is the description of the effects of amyl nitrite upon animals; accelerated breathing and palpitations were the result, evidently similar to the physiological phenomenon in man. In the latter case, whether produced by the ether or by psychic emotion, the phenomenon is exactly the same.—Report on the Crustacea observed on board the *Challenger* between the Cape of Good Hope and Australia, in the Antarctic seas, by Willemoes-Suhm.—On the ascending currents of air in our atmosphere, by J. Hann.—On the finer structure of the electric organs of fish, especially of the species Torpedo, Malapterurus, and Gymnotus, by F. Bol.—On the point of combustion: a lecture delivered by A. Mitscherlich before the Chemical Section of the Association of Naturalists at Breslau.—On the fossil Cetacea of Europe, by J. F. Brandt.—On the diatoms of the coal age, by F. Castracane. The author succeeded in proving the existence of diatoms in a piece of Lancashire coal; it was powdered finely, and burnt in a stream of oxygen. The residue was treated with nitric acid and chlorate of potash, and then washed. The species he found were all sweet-water species, with the exception of a Grammatophora, a little Coscinodiscus, and an Amphipleura, and comprised the following:—*Fragilaria Harrisonii*, Sm.; *Epithemia gibba*, Ehrbg.; *Sphenella glacialis*, Kz.; *Gomphonema capitatum*, Ehrbg.; *Nitzschia curvula*, Kz.; *Cymbella scotica*, Sm.; *Synedra vitrea*, Kz.; and *Diatoma vulgare*, Bory.—On the Chætopoda of the Atlantic, by E. Ehlers; account of the results of a collection made on board the *Porcupine* in 1869.—Studies on the diameter of the sun, by P. Rosa. These studies were published after the death of the author, by Fathers Secchi and Ferrari, and contain many interesting details which are well worth the attention of astronomers.—On the absorption spectra of some yellow vegetable colouring matters, by N. Pringsheim. The result of these investigations seems to be that these colouring matters are merely modifications of chlorophyll, and that there exist numerous modifications of this substance, from the brightest yellow to the darkest green.—On the influence of the concentration of blood upon the motion of the blood-corpuscles.

SOCIETIES AND ACADEMIES

LONDON

Physical Society, May 8.—Prof. Gladstone, F.R.S., president, in the chair.—Mr. Crookes, F.R.S., exhibited and described some very important experiments on attraction and repulsion resulting from radiation, which he has recently submitted to the Royal Society, and of which an account has already been given in this journal (vol. xi. p. 494). It is unnecessary therefore to describe them at length, but it may be pointed out that the most beautiful of the instruments is one which Mr. Crookes calls a radiometer. It consists of four arms suspended on a steel point resting in a cup so that they are capable of revolving horizontally. To the extremity of each arm is fastened a thin disc of pith, lampblacked on one side, the black and white faces alternating. The whole is enclosed in a glass globe, which is then exhausted as perfectly as possible and hermetically sealed. Several of these instruments varying in delicacy were exhibited, and experiments made showing the influence of light and heat of different degrees of refrangibility, and in proof of the law of inverse squares, &c.—The President, in expressing the cordial thanks of the Society, referred to Mr. Crookes' statement that the repulsion was proportional to the length of the vibrations, and asked whether at the red end of the spectrum there was an abrupt termination of the action, and a gradual diminution towards the ultra violet.—Mr. Walenn inquired as to the action of the magnet and of different axes of crystals in causing repulsion.—Prof. Woodward made some observations with reference to the manipulation.—Prof. Guthrie paid a graceful compliment to Mr. Crookes' work, and observed that researches might be divided into two classes; those in which the value of the work outweighed the merit of the author, and those in which a result of comparatively trifling significance is the outcome of years of patient labour. He expressed a strong conviction that Mr. Crookes' research had, in an almost unparalleled degree, both elements of greatness.—Mr. Crookes stated, in reply to Dr. Gladstone's question, that the glass envelope of the radiometer