

Crown, R.A. 237°, N.P.D. 55°. The same shower has also been recognised by Robert P. Greg, F.R.S., of Manchester, England. This meteor-stream, it is now proposed to show, is probably derived from one much more conspicuous in ancient times.

In Quetelet's "Physique du Globe," pp. 290-297, we find meteoric displays of the following dates. In each case the corresponding day for 1870 is also given,* in order to exhibit the close agreement of the epochs.

1.	A. D.	401,	April 9;	corresponding to	April 29,	for 1870
2.	"	538	" 6	"	" 25	"
3.	"	839	" 17	"	May 1	"
4.	"	927	" 17	"	April 30	"
5.	"	934	" 18	"	May 1	"
6.	"	1009	" 16	"	April 28	"

The epochs of 927 and 934 suggest as probable the short period of seven years. It is found accordingly that the entire interval of 608 years—from 401 to 1009—is equal to 89 mean periods of 6.8315 years each. With this approximate value the six dates are all represented as follows:—

From A. D.	401 to A. D.	538	we have 20 periods of 6.85 years
"	538	" 839	" 44 " 6.84 "
"	839	" 927	" 13 " 6.77 "
"	927	" 934	" 1 " 7.00 "
"	934	" 1009	" 11 " 6.82 "

This period corresponds closely to those of several comets whose aphelion distances are somewhat greater than the mean distance of Jupiter. So long as the cluster occupied but a small arc of the orbit, the displays would evidently be separated by considerable intervals. The two consecutive showers in the tenth century indicate, however, an extensive diffusion of the cluster at that epoch; so that the preceding part passed the node April 30, 927, and the following part, May 1, 934; the interval being somewhat more than one complete period. The comparative paucity of meteors in modern times may be partially explained by the fact that the ring has been subject to frequent perturbations by Jupiter.

It is not impossible that this meteor-stream was connected in its origin with the comet which passed its perihelion on April 29, B.C. 136. DANIEL KIRKWOOD

SOCIETIES AND ACADEMIES

LONDON

Geologists' Association.—The excursion to Ludlow and the Longmynds on July 22 and five following days, the concluding and most important field meeting of the season, was under the direction of Prof. Morris, F.G.S., Mr. R. Lightbody, F.G.S., and the Rev. J. D. La Touche, B.A. After the members had assembled in Ludlow Castle the Upper Ludlow rocks on the right bank of the Teme were examined, and Mr. Lightbody gave his reasons for considering the Aymestry Limestone to be represented at a point near the old bridge, although *Pentamerus Knightii* is not found here. The Upper Ludlow contains *Chonetes lata* in great abundance, and scarcely a fragment of the rock was picked up without this species being seen on the surface. From the high ground by the river side the valley of the Teme may be advantageously seen. The river here flows through a gorge in the Upper Ludlow rocks, with the castle and town of Ludlow picturesquely situated on the left bank; while the "Old Red" country extends beyond to the Clee Hills, the igneous summits of which commandingly rise to the east, surrounded by the coal measures. The well-known section in Ludford Lane, showing the "bone-bed," was next visited. This bone-bed, or "gingerbread," as it is sometimes called from its appearance, is in places not more than a quarter of an inch thick, and is found only after careful search. The fragments of the remains of fish, of which it is partly made up, were until comparatively recently the oldest fish remains known. The following day (Tuesday) was devoted to an examination of sections of the Aymestry Limestone, Lower Ludlow, and Wenlock rocks, occurring in the course of a route of about twenty miles. The journey was performed by means of carriages, but abundant occupation was given for the hammers of the party at the various exposures of the richly fossiliferous rocks above named. Graptolites from the Lower Ludlow were obtained in abundance, and fine specimens of *Phacops longicaudatus* were found in the Wenlock, exposed in the bed of the Teme, near Burrington; while

Pentamerus Knightii was seen in great profusion in the Aymestry Limestone of Ruacktree. Near Comus Wood (so called from being the scene of Milton's "Comus") a very extensive view is obtained of the "Old Red" district of Herefordshire, with the Malverns distinctly seen in the distance. In the evening the members were entertained at a *soirée* given by H. Salway, Esq., of "The Cliff," Ludlow. During Wednesday the Upper Ludlow rocks in the valley of the Teme were subjected to further examination, and the party proceeded as far as Downton, where the uppermost members of the series are seen at the Tin Mills section. At one point on the road to Downton the physiography of the district to the north of Ludlow is well seen, and here Prof. Morris pointed out the principal features of the extensive landscape, and showed how entirely due they were to their geological structure, and that the coal measures of the Clee Hills had been preserved by the old volcanic outbursts which had formed the central masses of hard "Dhu-stone" composing the summits and caves of these lofty hills. On Thursday the party ascended the Longmynds at their southern extremity, where masses of quartzose conglomerate of Cambrian age protrude from the surface. The Rev. Mr. La Touche described the topography and the geology of the district seen from the elevated ground on which his hearers were assembled, and, subsequently, Dr. Hicks explained the order of the succession of the Cambrian and Lower Silurian rocks of St. David's, which he had been re-examining during the previous fortnight, and which he considers to have representatives in some of the beds of the Longmynds. The Llandovery conglomerates lying on the uplifted beds of the Cambrians at an angle of 22° were found to be exposed on the eastern slope of the hill, and the "Pentamerus limestone," with its characteristic *Pentamerus oblongus*, was also seen. The party then proceeded to the quarries of Caradoc sandstone in the Onney valley, at one of which Prof. Morris gave a general description of the Silurian system and the extension in England of its various members. Friday was occupied by a journey in carriages to the mining district of Shelve, and by an inspection of the very interesting hill-country between that place and Church Stretton. Quarries in the Cambrian rocks at the south end of the Longmynds and in Llandovery beds near Norbury occasioned stoppages, and afterwards a visit was paid to Linley Hall, the residence of Mr. Jasper Mare, who courteously invited the party to inspect his fine model of the South Shropshire mining districts, the famous pig of lead of Roman age, with the name of the Emperor Hadrian upon it, found near Shelve, and specimens of the mineral products of the locality of extraordinary size and beauty. The members were then entertained at luncheon, after which they left Linley Hall and traversed a long, narrow, and very beautiful valley in the park, and terminating at the Stiper Stones. At a little distance from the park enclosure a mass of felspathic ash in Lower Llandeilo rocks is quarried for road metal, and the Llandeilo beds thus laid bare were eagerly and most successfully searched for fossils. After a brief visit to the White Grit Mine, the carriages were finally left, and the party commenced the ascent of the Stiper Stone ridge, from the summit of which is seen a fine panorama of the Welsh mountains, with the old volcanic Condon in the foreground, and Cadir Idris and Plynlimmon in the extreme distance. The extraordinary masses of obtruding hard white quartzite rocks called the Stiper Stones were objects of great interest to the party, some of the members of which were not satisfied with the evidence of their being the equivalents of the Lingula flags. The Longmynds ridge, extending for nearly fifteen miles, bounds the view to the east, and this range had now to be crossed. The intervening valley affords several sections, at one of which was seen what was considered by Murchison to be the junction of the Silurians with the Cambrians. Near the summit of the Longmynds a very fine exposure of Cambrian conglomerates occurs; and further along the edges of the vertical green and purple shales and slates are seen beneath the feet as the mountain road is traversed. On the eastern side of the range the rocks are well exposed, and the indenting gorges numerous and picturesque. Caer Caradoc stands boldly out at a little distance to the north-east, with the Wenlock and Aymestry limestone ridges beyond, and bounding a valley of great beauty and extent, terminated northwards by the volcano-like cone of the Wrekin, at the foot of which the Severn flows through a deep gorge. The morning of the concluding day, Saturday, was given to an examination of the Upper Ludlow rocks, the "Bone-bed," and the Downton sandstone in the neighbourhood of Morto.

* Making proper allowance for the precession of the equinoxes.

Camp and Oviury; and the week's proceedings concluded with a visit to Stokesay Castle, in which the Rev. James Parker gave an interesting account of the curious old pile. Thanks were most warmly accorded to the Rev. Mr. La Touche and to Prof. Morris for their able conduct of the excursion, and the members then took their departure from the Craven Arms Station, congratulating each other on the very interesting, instructive, and successful character of the visit of the Geologists' Association to Shropshire.

KENT

East Kent Natural History Society, August 1.—A communication was made by Mr. Gulliver, F.R.S., in relation to the shark (*Lamna Cornubica*) taken last November off Rye. As this is the first description of this important skeleton of this huge fish, which may now be seen at the College of Surgeons, we give it at some length. This shark is the Porbeagle of many authors and the Beaumaris Shark of Pennant. Every anatomist knows more or less how an ordinary natural skeleton is made; but as this of the Porbeagle is an extraordinary one, it is well worth while to note some of the means employed in its preparation. In the first instance careful measurements were made of the different appendages, and kept for guidance in regulating their due position, since in the drying there would be much distortion or displacement which could only be corrected by a constant reference to their state in the fresh fish. Then came the question, how to get out the brain; and this it was found could be easily done through a natural opening—a sort of fontanelle—more than an inch in diameter, in the upper and front part of the skull. Next, it was foreseen that, in such a large fish, there would be great shrinking in its length from the contraction by drying of the intervertebral substances, as had happened to the skeleton of this shark at Haslar; and this fault was prevented by the insertion between the bodies of the vertebrae of temporary wedges or plugs of wood. And as the skull and orbits, being cartilaginous, would shrink and curl into a shapeless and ugly mass, unless means could be devised to preserve their form, all these parts were supported by plaster casts, while the foramina were kept open by wooden plugs. In this state six weeks were passed in the drying, although this was often hastened by artificial heat. The plugs and plaster being removed, the skeleton parts were left in their natural form and position, as now so admirably preserved for the instruction of anatomists. The eyes, too, are shown *in situ* without the least shrinking. The spine has been strengthened by a strong cane introduced along the neural canal, and remaining permanently there, but not visible without curious inspection. It is remarkable that there is but little fatty matter in the skeleton. Among the manifold parts of the skeleton are seen, in their natural position, the five pairs of Branchial Arches; the Hyoid Arch with its three pieces on each side, and the Branchiostegous Rays; the Scapular and Pelvic Arches; and, as appendages of the pelvis, the pair of osseous Claspers, each of two pieces and a curious Spine of hard bone, particularly noticed by Prof. Flower, at the free end. The Vertebrae, of which the number has not hitherto been recorded in this species, are, as counted by Prof. Flower and Mr. Gulliver, no less than 152, of which 60 belong to the tail. These caudal vertebrae turn abruptly upwards at an angle of about forty degrees from the straight vertebral column of the trunk, and run straight along the upper border of the superior lobe of this caudal fin. The frame-work of this fin-lobe is chiefly formed of the caudal vertebrae, with their broad and flat inferior spinous processes; the lower lobe of the caudal fin is composed of a densely-packed layer or plate of parallel rays proceeding from above downwards, and apparently of fibro-cartilaginous texture. The vertebral column has no ribs. The Rays of the front Dorsal Fin are distantly jointed; the joints like those of soft-finned bony fishes, but much further apart in each ray; and this is so remarkable in the Pectoral Fins of this fish as to remind us of the digital phalanges of mammalia. Of course, every ichthyologist well knows that the caudal fins of the Plagiostomes are unequal (heterocercal); but it is not so familiarly known that the caudal vertebrae in several of these fishes, and also in some other fishes, pursue a different course. Indeed, the disposition of the caudal vertebrae of osseous and cartilaginous fishes, both in adults and in the different stages of development, affords, as Agassiz and Huxley have recognised, a very interesting subject for more research than has yet been devoted to this branch of ichthyology. Meanwhile we have in this skeleton of the Porbeagle a noble contribution to the osteology of the Selachians.

PARIS

Academy of Sciences, July 22.—A paper was read by Prof. Cayley on the conditions enabling a family of given surfaces to form part of an orthogonal system.—M. A. de Caligny communicated a note on a liquid vein formed in part by a current, and in part by the blows of the waves against two convergent breakwaters.—A note on the vibrations of cords under the influence of a diapason by M. E. Gripon was read.—M. F. Lucas communicated the results of experiments made by him in the Seine during the siege of Paris for the purpose of ascertaining how far the waters of the river would convey sounds which might be employed for telegraphic purposes. He found that the sounds produced by heavy bells were not transmitted more than 1,500 to 1,800 metres.—M. W. de Fouvielle described a new example of the danger caused by large masses of metal during thunderstorms.—M. Le Verrier read a memoir on the masses of the planets and the parallax or the sun, in which he indicated that in the present day the exact determination of these and some collateral matters had become a necessity, and dwelt especially upon the desirableness of a new direct measurement of the velocity of light. Upon this subject MM. Fizeau and d'Abbadie made some remarks.—M. Boussingault communicated a note on the determination of iron in the blood of an invertebrate animal. The animal employed was the common garden slug; its blood contains only 0.00069 per cent. of iron.—A note was read by M. P. Thénard on a new process for the quantitative determination of ozone, and a second by the same author on the action of permanganate of potash or oxygenated water in the midst of a freezing mixture.—M. Sacc presented a memoir on a new process for the preservation of alimentary substances by means of acetate of soda.—M. Berthelot communicated a note on the constitution of acid salts in solution; and MM. P. Champion and H. Pellet a note on the theory of the explosion of detonating compounds.—M. A. Boillot described a process for the preparation of ozone by means of a new mode of production of the electrical effluvia.—M. C. Bernard communicated a further note by M. Oré on M. Liebreich's endeavour to demonstrate that strychnine is an antidote to chloral.—M. C. Robin presented a note by M. Rabuteau on the physiological properties of quinic acid, and on the reduction of perchloride of iron in the organisms; and M. C. Sainte-Claire Deville communicated a letter from M. Diego Franco on the late eruption of Vesuvius.

PAMPHLETS RECEIVED.

ENGLISH.—Cassell's Book of Birds, Part XXIII.—The Lead and Zinc Mines of the Mendip: H. B. Woodward, F.G.S.—What determines Molecular Motion? the Problem of Nature.—The Industrial Monthly, No. 5, Vol. vii.—The Journal of Applied Chemistry, No. 7, Vol. vii.—A Letter to the Most Noble the Marquis of Salisbury on the Public Health Bill: G. W. Child, M.A.—The Building and Ornamental Trades of Great Britain and Foreign Countries: E. Hill—Greville, No. 2: M. C. Cooke.—Proceedings of the Geologists' Association, No. 6, Vol. ii.—The Monthly Microscopical Journal, August.—The Astronomical Register, August.—The Publishers' Circular, August.—Journal of the Chemical Society, July.—The Food Journal, No. 31, Vol. iii.

AMERICAN AND COLONIAL.—The American Chemist, No. 12, Vol. ii.—The Canadian Naturalist, No. 4, Vol. xiii.—The American Naturalist, No. 7, Vol. vi.—The American Journal of Science and Art, No. 18, Vol. iii.—The Cincinnati Medical News, Nos. 5 and 6, Vol. i.—The Indiana Journal of Medicine, Nos. 1 and 2, Vol. iii.—Van Nostrand's Eclectic Engineering Magazine, No. 44, Vol. vii.

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