

## Did Flowers Exist during the Carboniferous Epoch?

THE systematic position of the genus *Breyeria*, founded for the reception of a fossil insect, having formed the subject of a recent discussion in NATURE (vol. xix. pp. 554, 582), I have just visited Brussels to examine the original type. Through the courtesy of M. de Borre I have been allowed to submit it to a careful microscopical scrutiny, and have sketched, with the aid of a camera lucida, a considerable part of it on a large scale. The facies of the neuriation is extremely similar to that of genera allied to *Palingenia* of the Ephemeridæ, resembling theirs not only in the relative abundance of cross-veinlets, but also in the manner of the aberrations of abnormal cross-veinlets. The *Palingenia* group is sufficiently elastic to comprise *Breyeria*, although this differs in detail to some extent from any known genus of recent Ephemeridæ.

May I be allowed to suggest that if photographs of fossil insect-remains be taken for critical purposes, it would be advantageous to execute them on a scale of considerable enlargement. In the present instance it was far easier to distinguish nervures from mechanical depressions in the stone when a 3-inch object-glass was employed, than when a 4-inch glass was in use. These are the lowest powers that I have with me, excepting simple lenses. *Apropos* of fossil insects, there is in Baron E. de Selys Longchamp's collection, a species of recent *Homoptera*, which is likely to be of interest to palæontologists. At first sight it resembles a fragmentary specimen of Ephemeridæ so closely that it was actually reserved for my inspection as such. Viewed through a weak lens, it would appear from its anterior wings to be a representative of the Planipennes, allied more or less to *Panorpa* perhaps. A more careful examination, however, reveals its rostrum and other characters distinctive of its real nature. Its exact affinities have still to be ascertained; but in all probability it is something new and extraordinary. A. E. EATON  
Rotterdam, July 24

## The Papau

I WAS surprised to read Capt. Oliver's statement in NATURE, vol. xx. p. 241, that the papau (*Carica papaya*) is not eaten by birds in Bourbon and Mauritius. In Samoa it is eaten largely by birds—especially by *Sturnoides atrifusca*, and also by bats of the genus *Pteropus*. The seeds of this fruit appear to have been carried by the agency of birds over at least a great portion of the islands. I have seen many places where the virgin forest has been cleared, and in every instance—as far as my memory serves me—a thick crop of *Carica* appeared as soon as the clearance was made. They do not grow while the forest stands, but spring up in thousands as soon as light is let in to the soil.

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## Intellect in Brutes

I HAVE just been watching with care the action of a party of ants, exhibiting an intelligence nearly allied to reason, if indeed it be not "reason."

Clearing the shelf in a hothouse, two large cockroaches were caught, killed, and left lying on the small gravel with which the shelf is covered. This shelf is four feet from the floor, and the nest of the ants is behind a slab at the end of the house. When the cockroaches were killed, very few ants were upon the slab, but they must have communicated to others the discovery of the treasure, for in about twenty minutes a swarm of ants emerged from the nest, climbed the wall, gained the shelf, and there, dividing into two parties, proceeded to take possession of the dead bodies.

To understand the significance of what I am about to relate, it is necessary to form a distinct conception of the comparative sizes of the ant and the cockroach. The ant was the smallest of its kind; the body of its prey was nearly two inches long and half an inch in width. The proportions were to each other as would be those of a man to the dome of St. Paul's. Their purpose was to carry these two huge carcasses to the nest, and to accomplish this it was necessary, first, to draw them for a space of ten inches over rough gravel, then along a smooth board for two feet, then to drop them to the floor beneath, then to drag them over some very rough rubble for one foot four inches, and finally to pass them between two slabs of wood into the nest. This extraordinary feat they performed successfully. It was accomplished thus: They surrounded the corpse of the dead

cockroach and seizing it with their mandibles, moved it onward a little way. It was lying inclined on its side. When moved, the projecting edges of the side hitched in the stones and prevented progress.

I observed that, on some larger stones near the spot, half a dozen ants stood looking at the work, but taking no part in it. When the hitch occurred, and always afterwards when there was an obstacle, these "surveyors" left their stations, went to the workers and then returned to their place of observation. They were manifestly directing the operation and instructing the labourers; and they as manifestly made some communication to the labourers, for forthwith these changed their plan. They now turned the cockroach on its back, and in this position they moved it onward triumphantly for three or four inches. How? They stood round the corpse at precisely equal distances apart and by a common effort dragged it forward. They pulled together, apparently in obedience to a signal from the "surveyors," just as men shout when they want to pull together.

Another obstacle. Three pieces of gravel bigger than the rest lay in their path. What to do now? They crept under the carcass and lifted it by planting the hind feet on the floor and standing upright, sustaining the load with their heads, while a party mounted the opposing stone, seized the tail, and tried to drag the burden up. But in vain. It was too much for their strength and the load was dropped.

Then the ants that had been directing again moved from their places and ran rapidly about in all directions, as if seeking some more easy passage. Having found one they remounted their post of observation and it may be assumed that they gave some intelligent orders to the labourers, for immediately these resumed their hold upon the carcass and moved it forward in the new direction indicated.

Similar obstacles occurred four times in the course of their journey over the gravel, and on each occasion the same proceedings were observed. Their patience was inexhaustible. At length the body was successfully brought to the smooth edge of the wooden shelf, whence it could be dropped to the floor beneath. But it was necessary to select a fit spot for this purpose, inasmuch as the floor was strewn with bricks and plants. In fact there was but one open space of about four inches square into which the body could be sent so as to be carried securely to its destination. To reach this spot they had to drag the burden along the ledge for a space of 17 inches. In this journey balance was repeatedly lost and the carcass would have fallen, but that it was seized, held, and dragged back by their united efforts. At length, having arrived at the place where its fall would be upon the open floor, it was dropped by all at once losing their hold of it. But previously to their doing so, the "surveyors" ran down the wall to the floor and posted themselves directly under the ledge on which the body lay (4 feet above them). There they waited its fall. I think their business there was to see if all was safe and the place really fit for the purpose, and that they made some communication as to the precise spot to be chosen for the fall, for the ants who bore the corpse shifted it two or three times before they let it down. Then all followed, running down the wall, seized their prey again, and in half an hour carried it a distance of nearly 3 feet to the entrance of the nest.

But here another difficulty occurred. It could not pass between the boards when lying upon its back. They turned on its side and tried again. Again they were baffled; the legs hitched. So they turned it on its back once more, bit off the legs, which were carried into the nest by other ants, and then the body was turned on its side and taken through the narrow way into the nest. To me, looking at it with the eyes of a psychologist, all this seemed to indicate the exercise of a *reasoning* faculty. They devised new methods of meeting new circumstances. It satisfied me, also, that ants at least have means of intercommunication. The fact of the find was obviously communicated by the discoverers. The workers manifestly acted under instructions and obeyed commands.

My object in this communication is merely to place upon record a very remarkable proof that the lower animals have intelligence very like our own. EDWARD W. COX

Moat Mount, Mill Hill, N.W., July 26,

As you are publishing notices of intelligence in brutes perhaps the following example of memory in a bird may be interesting. When I returned from the Pacific about two years ago, I brought