

female *Cancer pagurus* which had copulated a little while before, and bore, buried in each of its copulatory pouches, a white, cylindrical, soft body, which appeared to me to be the terminal portion of the membranous penis of the male separated from the rest of the sexual organs of the latter. I regret that I have not had the opportunity of repeating this observation, *since my attention has been directed to the spermatophores*; for it is possible that the sort of stopper in question left in the vulva may have been a body of that nature rather than a fragment of a penis."

In dissecting a female *Maia squinado*, I found in its copulatory pouches bodies analogous to those indicated by M. Milne-Edwards. The histological examination of these bodies proved that they could not be regarded as fragments of a penis. In fact they showed no trace of organized tissues. It is therefore possible that they must be regarded as remains of the spermatophores of the male. However, as I have not hitherto had the opportunity of observing spermatophores in the Brachyurous Crustacea, I shall not venture to speak decidedly upon this point.—*Comptes Rendus*, March 23, 1874, p. 855.

On the Felis euphilura from Shanghai, in the British Museum.

By Dr. J. E. GRAY, F.R.S. &c.

The British Museum has received from Mr. Webb, through John Russell Reeves, Esq., a wild cat from Shanghai. It has the colour and much of the spotting of the *Felis rubiginosa* from Western India; but it is quite different from that long-headed, long-tailed cat in being a short-headed, short-tailed animal, and in the short skull having the incomplete orbits of the true cats, instead of being long and with the complete orbits of *Viverriceps rubiginosa*.

This cat has all the characters of the smaller spotted Asiatic cats with short spotted tails, on which I published a paper in the 'Annals' for January 1874 (xiii. p. 55).

I am inclined to regard it as a perfect specimen of the *Felis euphilura*, described by Mr. Elliot and figured by Mr. Wolf, P. Z. S. 1871, p. 761, t. lxxvi., from a very bad skin, now in the British Museum, supposed to have come from Siberia.

The possession of a perfect skin and skull of this confirms it as a distinct species. The specimen in the Museum chiefly differs from Mr. Wolf's figure in the streaks on the crown and nape not being quite so wide, and in the tail being rather longer and more cylindrical, which is easily explained when we consider the very bad state in which the skin figured by Mr. Wolf was.

The skull has very large, prominent, swollen, compressed bullæ to the ears, and a large deep subcircular cavity at the inner side of the hinder part of the flesh-tooth and the small tubercular grinder.

On the Amount of Pressure in the Sap of Plants.

By Prof. W. S. CLARKE, of Amherst.

It only remains to state in a few words the results obtained by the application of mercurial gauges to the sugar-maple, the black birch, and the grape-vine. Observations were made on one or more

gauges several times daily, and occasionally every hour of the day and night, from the 1st of April to the 20th of July.

A gauge was attached to a sugar-maple, March 31st, which was three days after the maximum flow of sap for this species, so that further observations are required earlier in the season to complete the record and determine with certainty the maximum pressure which it exhibits in the spring. Of the record made, the following facts are specially interesting: first the mercury was subject to constant and singular oscillations, standing usually in the morning below zero, so that there was indicated a powerful suction into the tree, and rising rapidly with the sun until the outward pressure was sufficient to sustain a column of water many feet in height. Thus at 7 A.M., April 21st, there was a suction into the tree sufficient to raise a column of water 25.90 feet. As soon as the morning sun began to shine on the tree the mercury suddenly began to rise, so that at 9.15 A.M. the pressure outward was enough to sustain a column of water 18.47 feet high, a change represented by more than 44 feet of water. On the morning of April 22nd the change was still greater, requiring for its representation 47.42 feet of water. These extraordinary fluctuations were not attended by any peculiar state of the weather, and happened twelve days before there were any indications of growth to be detected in the buds. These observations are believed to be quite new, and as yet inexplicable, but will receive further attention another spring.

The maximum pressure of the sap for the season was observed at 10 A.M., April 11th, and was equal to sustaining a column of water 31.73 feet high. This was an excellent sap day, considering the lateness of the season. There was noticed a general correspondence between the flow of sap in other maples and the pressure on the gauge.

After April 29th the mercury remained constantly below zero, day and night. During the month of May there was a uniform suction equal to about 8 feet of water; and the unaccountable feature of this fact is, that, though apparently produced by exhalation from the expanding leaves, it remained the same, day and night, for several weeks. In June the suction gradually lessened, and finally disappeared, the mercury standing steadily at zero.

On the 20th of April two gauges were attached to a large black birch—one at the ground, and the other 30 feet higher. The next morning at six o'clock the lower gauge indicated the astonishing pressure of 56.65 feet of water, and the upper one of 26.74 feet. The difference between the indications of the two gauges was thus 29.91 feet, while the actual distance between them was 30.20 feet, so that it corresponded almost exactly as if they were connected by a tube. In order to learn whether the same principle would prevail if the upper gauge was moved, it was raised 12 feet higher. The same correspondence continued through nearly all the observations of the season, notwithstanding the gauges were separated by 42.20 feet of close-grained birch-wood.

At 12.30 P.M., April 21st, a hole was bored into the tree on the side opposite to the lower gauge, and at the same level. Both

gauges at once began to show diminished pressure, while sap issued freely from the orifice. In fifteen minutes, one pound of sap having escaped, it was found that both gauges had fallen equal to 19·27 feet of water. Upon closing the hole the gauges rose in ten minutes to their previous level, showing that the rootlets had reabsorbed in that brief period the sap which had escaped from the tree, notwithstanding the enormous pressure already existing.

A stopcock having been inserted into the hole opposite the lower gauge, it was found that the communication between it and the two gauges was almost instantaneous, which appears to prove that the tree was entirely filled with sap, exerting its pressure in all directions as freely as if standing in a cylindrical vessel more than 60 feet in height, as indicated by the lower gauge. The sap-pressure continued to increase until, on the 11th day of May, it represented a column of water 84·77 feet in height, which is believed to be the highest pressure of vegetable sap ever recorded.

The buds of the birch now began to expand, the pressure of the sap to diminish, and the oscillations of the mercury to become more decided and regular than before. The upper gauge ceased to vary May 14th, remaining stationary at zero. The lower one declined slowly and varied greatly, but did not fall below zero until May 18th. On May 27th it also became stationary at zero. The suction manifested by the birch was very little, never exceeding 9 feet of water, and continued only for a few days.

To determine, if possible, whether any other force than the vital action of the roots was necessary to produce the extraordinary phenomena described, a gauge was attached to the root of a black birch tree, as follows. The tree stood in moist ground at the foot of the south slope of a ravine, in such a situation that the earth around it was shaded by the overhanging bank from the sun; a root was then followed from the trunk to the distance of 10 feet, where it was carefully cut off 1 foot below the surface, and a piece removed from between the cut and the tree; the end of the root thus entirely detached from the tree, and lying in a horizontal position at the depth of 1 foot, in the cold damp earth, unreached by the sunshine, and for the most part unaffected by the temperature of the atmosphere, measured about 1 inch in diameter: to this was carefully adjusted a mercurial gauge, April 26th. The pressure at once became evident, and rose constantly with very slight fluctuations, until at noon on the 30th of April it had attained the unequalled height of 85·80 feet of water. This wonderful result showed that the absorbing-power of living birch-rootlets, without the aid of any of the numerous helps imposed upon them by ingenious philosophers, such as exhalation, capillarity, oscillation, dilatation, contraction, &c., was quite sufficient to account for the most essential of the curious phenomena connected with the circulation of sap. Unfortunately, in an attempt to increase the capacity of the gauge, the bark of the root was injured, and this most interesting experiment terminated. There can be little doubt that future trials, carefully conducted with suitable apparatus, will achieve even more marvellous results.

The original experiment of applying a mercurial gauge to the grape-vine, first tried by the Rev. Stephen Hales, of England, one hundred and fifty years ago, was repeated May 9th, and a pressure of 49·52 feet of water obtained May 24th. This is $6\frac{1}{2}$ feet higher than was observed by Hales. The peculiar features of the pressure of the vine-sap are:—its lateness in the season; its apparent independence of the weather; its uniform and moderate rise, day and night, to its maximum; its very gradual decline to zero without any marked oscillations; and its constant and almost unvarying suction of from 4·5 to 6·5 feet of water, manifested from June 20th to July 20th, when the observations ceased.—*From the Eleventh Annual Report of the Massachusetts Agricultural College*, January 1874.

The Bogotá Cat (Felis pardinoides, Gray).

By Dr. J. E. GRAY, F.R.S. &c.

In the 'Annals' for 1874, xiii. p. 51, I gave the reasons for differing from Mr. Elliot's opinion that the cat I named *Felis pardinoides* in the British Museum, received from the Zoological Society as coming from India, was the same as *Felis Geoffroyi*. At the same time I observed, "the Indian habitat has not been confirmed; and the species has a very South-American aspect."

The British Museum has received, from Mr. Edward Gerrard, a cat from Bogotá that I have no doubt is the same species as the typical specimen of *Felis pardinoides*; but it differs from it in being a nearly adult specimen, as is proved by the examination of the skull; and it has a more fulvous tint, and the fur is softer; but this may only depend upon the age and season in which it was killed.

This species of South-American spotted cat has the small head and much the character of *Felis macroura*; but the tail is rather tapering and not so long; instead of having the few broad black rings of that species, it has a larger number of narrow black rings, which are interrupted on the lower side, and these rings on the hinder half of the tail are broader and more distinct than those of the basal half. The spots on the body are much more numerous; and those on the hinder parts of the sides are pale, surrounded behind with an imperfect ring of small black spots.

The Habitat of Pelargopsis gigantea.

To the Editors of the Annals and Magazine of Natural History.

21 Opernring, 4. Stock,
Vienna, 23/5/74.

DEAR SIRS,—In the note on the "*Habitat of Pelargopsis gigantea*" in your Journal (May 1874), line 6 of the text, is a misprint in the fifth word. It must be "Joló," and *not* "Toló."

You will oblige me by rectifying this in your next number, as this misprint is disagreeable in a note wherein I correct the statement of another.

Yours very truly,

A. B. MEYER.



Clarke, W S. 1874. "On the amount of pressure in the sap of plants." *The Annals and magazine of natural history; zoology, botany, and geology* 13, 472-475. <https://doi.org/10.1080/00222937408680907>.

View This Item Online: <https://www.biodiversitylibrary.org/item/78506>

DOI: <https://doi.org/10.1080/00222937408680907>

Permalink: <https://www.biodiversitylibrary.org/partpdf/62198>

Holding Institution

University of Toronto - Gerstein Science Information Centre

Sponsored by

University of Toronto

Copyright & Reuse

Copyright Status: NOT_IN_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.