

coming from a level (2s) higher than the normal. Hence Eucken's calculations seem to be quite beyond the mark.

Eucken finds from the same line of argument that the energy of dissociation of  $O_2$  cannot be less than  $4.25 \times 10^6$  calories.

If this were true, no atomic oxygen can occur in the sun. But it is well known that Runge has identified the oxygen triplet  $\lambda\lambda 7772, 7774, 7775$  in the Fraunhofer spectrum. According to Hopfield, the excitation potential for these lines is from 8 to 9 volts, so that in the sun, oxygen is not only completely dissociated, but also a considerable fraction of O-atoms is brought to a higher level. The argument is, therefore, fairly decisive that in the case of  $O_2$ , Eucken's calculations are very wide of the mark.

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### Winged Pollen-grains and Flowering Plants (Angiosperms).

IN a recent discussion (Linnean Society, January 21) on the relationship between Dr. Hamshaw Thomas's new race of Jurassic fossil plants, the Caytoniales, and modern flowering plants, the challenge thrown out that winged pollen-grains are not to be found among existing Angiosperms was accepted, and the genus *Sararanga* (Pandanaceæ) was brought forward as possessing such. This appears to be incorrect. The genus was founded by Hemsley in 1894 (*Journ. Linn. Soc.*, 30, 216) on the female flowers. Later the male flowers were described by Stapf in Hooker's "Icones Plantarum," 26 (1899), and the pollen-grain is there stated to be "ellipsoideis minute papillatis," and depicted so in a figure. There is no mention of wings (air-vesicles), nor are such shown in the drawing. I have myself examined the pollen from dried material and have failed to find the least trace of anything of this nature. Besides the original species (*S. sinuosa*), one other has since been added to the genus, founded only on a fruiting specimen.

Being suddenly confronted with *Sararanga*, as I was making my statement that winged pollen-grains do not occur among existing Angiosperms, naturally prevented my making the point I intended, especially as the genus was then new to me. Possibly also it was unknown to nine-tenths of the audience, who might therefore have left with the impression that as both the Caytoniales and *Sararanga* had winged pollen-grains, this feature in common favoured some affinity between them, and strengthened the supposed relationship between this new fossil group and the flowering plants generally. Hence this letter.

As the challenge is still open, my point might still bear statement. The probable possession of winged pollen-grains (microspores) by the Caytoniales indicates this race of plants as having been wind-pollinated (anemophilous). Dr. Thomas, assuming on other grounds that there is an affinity between the two races of plants, argues from these winged pollen-grains that the primitive Angiosperms could not have been insect-pollinated (entomophilous). How is it, then, that such supposed primitively anemophilous Angiosperms as the Screw Pines (Pandanaceæ) and the catkin-bearing families (Amentiferae) have not retained this efficient mechanism for the conveyance of pollen through the air? On the view held by the writer that all existing flowering plants were probably descended from entomophilous stock, and that where anemophily occurs it is derivative and not primitive as in Gymnosperms, the absence of winged pollen-grains is understandable. Perhaps

geologically there has not yet been time for their evolution, even in those forms, such as some of the Amentiferae, which were probably among the earliest to substitute anemophily for entomophily.

At the meeting, stress was laid on the resemblance between the male panicle of *Sararanga* and Antholiales. This, however, can only be superficial, unless our morphological conceptions are at fault; for we are attempting to compare a shoot-structure (inflorescence) with a leaf-structure (a sporophyll or part of one). The resemblance is also strong between the individual tuft of microspore-bearing bodies of *Antholites* and the male flower of *Pandanus*. This again can surely have no phylogenetic significance; for there is evidence that the unisexual flowers of the Pandanaceæ have been derived by reduction from hermaphrodite ones. In the male flower of *Freyinetia*, a genus belonging to this family, a rudimentary gynœcium is actually present.

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January 27.

### The Leaping Salmon.

DR. DAVID STARR JORDAN's letter in NATURE of January 16 induces me to send a photograph which excels, I think, even that to which he refers. Its beauty lies in the fact that the markings on the fish,

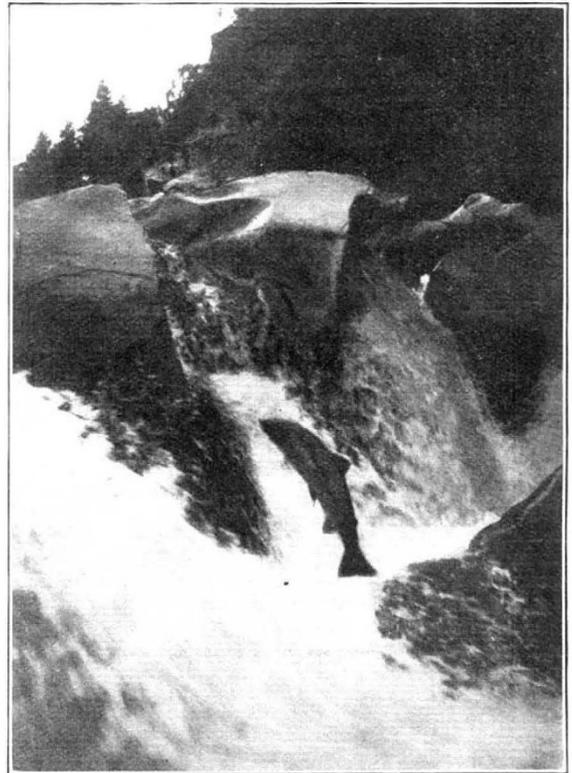


FIG. 1.

its eye, and even its mouth, are clearly visible; in all other photographs of leaping salmon which I have seen, the fish has been a mere silhouette.

The photograph was taken at the well-known "Salmon Leap" on the River Garry at Struan, Perthshire, in August 1924. The fall is some twelve feet high, and it was an evening when the water was fairly full and the salmon were particularly lively in