(6) Change of direction can be produced (just as it can in a planing bird) by lateral tilt of the body.

(7) Rise and fall are certainly possible (due to forcing up of air by waves), but I have been unable to observe any cant of the planes which produces this.

(8) The fish can easily outstrip a vessel doing 17 knots.

(9) The majority of fish turn into the wind when launching themselves. On December 12, 1919, simultaneous observations were made by two observers for periods of 1½ minutes upon the windward and leeward sides of the ship. Twice as many fish "flew" to windward as to leeward. In some counts the results were as high as eight to windward without a single fish going to leeward.

(10) They can remain in the air for at least half a minute (I fancy I have seen much longer flights when in the cable ships). On December 18, 1919, the following flights were timed:—10 seconds (three times), 15 seconds (four times), 25 seconds, with tail splashes (twice), 28 seconds (numerous tail splashes, once), and 30 seconds (numerous tail splashes, once).

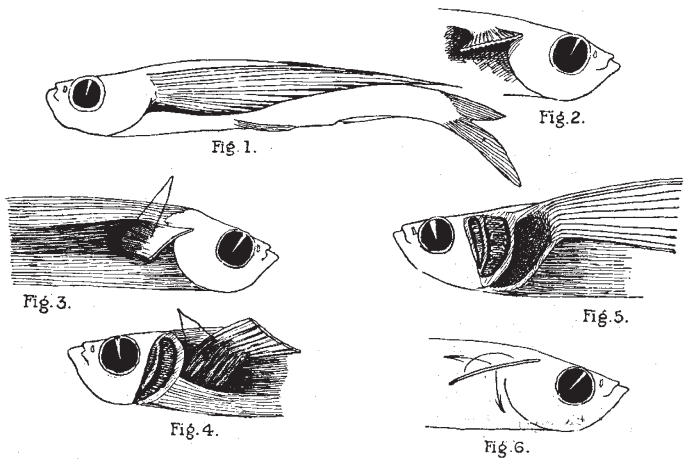

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

FIG. 1.—General lines upon which the fish is built.

FIG. 2.—The pectoral fin was placed in the position of flight, and the specimen then hardened in formalin. The right fin is represented cut through near its base.

FIG. 3.—Dissection of the dorsal or posterior muscle (tinted), showing the depression in the general longitudinal muscle mass of the body into which the fin fits when hauled up and back by its retractor muscle. The tinted muscles in Figs. 3 and 4 are indicated by the lines ⅄.

FIG. 4.—Dissection of the ventral on anterior muscle (tinted). Numerous tendons pass the fin-rays from small pale muscle. Evidently the muscle hauls the rays and spreads the wing like a fan.

FIG. 5.—The ventral muscle removed to show the depression in the gill base skeleton which it occupies.

FIG. 6.—Diagram to show direction of action of the two muscle masses.

(11) The dorsally situated mouth and the enlarged ventral fluke of the tail-fin tell clearly that the fish is one designed to make rushes *upwards* through the water in search of food.

(12) Its "flight" is only an extension of the flight of the garfish. These fish also launch themselves into the air, and without any planing, but merely by their impetus, travel for a sufficiently long and rapid "flight" to carry them—like a hurled spear—right through the sail of a boat.

(13) Only two main muscle masses are attached to the base of the pectoral fin. The posterior muscle pulls the fin upwards and backwards and folds it into the "slot" for its reception. The anterior muscle pulls the fin downwards and forwards and spreads it as a plane.

(14) These muscles do not produce "flight" movements of the fin, the stroke of the ventral (anterior) muscle being downwards and forwards, and not downwards and backwards.

(15) The structure of these muscles is altogether unlike that familiar in muscles performing the short, quick strokes of flight, but is entirely what would be expected of muscles acting tonically as spreaders of planes.

F. WOOD-JONES.

University of Adelaide.

"Space" or "Æther"?

PROF. EDDINGTON (NATURE, April 14, p. 201) challenges those of us who have asserted that "relativity does away with the æther" to defend our statement. He himself provides our defence. He tells us that *his* æther—the æther that relativity does *not* do away with—"has not . . . density, elasticity, or even velocity." But *our* æther—the æther of pre-relativity days, which relativity *has* done away with—has all those properties. In particular, it has the last. The nineteenth-century æther simply was a system relative to which light had the normal and invariable velocity c; so that the velocity of light relative to a system which had, relative to the æther, the velocity v was $c+v$. That statement conveys the very meaning and essence of the old æther; deny it, and the Fizeau and Michelson-Morley experiments lose all significance.

Prof. Eddington's word "æther" has neither the denotations nor the connotations of the old word. His use of it will receive the support of Humpty-Dumpty, but not of those who consider that accuracy of thought is intimately dependent upon the constancy of the meaning of the words used to express it.

NORMAN R. CAMPBELL.

I AM indebted to Prof. Eddington (NATURE, April 14, p. 201) for pointing so decisively to the full issues of my argument (NATURE, April 7, p. 171). The position may be clinched thus:—The relativists may take away *pure space* as an objective entity, but in so doing they are "ætherising" or materialising the space of the physical universe. So the physicists get back their "æther" with something more; and "space," a fundamental fact of human experience which has been such a metaphysical enigma right down the ages, at least becomes intelligible as the substratum of matter. The identification of æther and space provides a mechanism of the universe, and will enable us to picture physically what is meant by such phrases as "world-lines" and "twists in space."

Prof. Eddington's reason why the quality of beauty is not included in physical science and my own are metaphysically identical, and the two propositions, very differently framed, confirm one another.

April 16. L. C. W. BONACINA.

Meteors on the Moon.

THE reported failure of Prof. Goddard to obtain pecuniary support for his project to discharge a giant rocket at the moon leads me to ask a question which astronomers may answer. Why is it that no observer has ever reported the descent of a meteor upon the surface of our satellite? It seems reasonable to suppose that meteoric falls must occur there as upon the surface of the earth. According to the accepted estimate, the earth receives about 20,000,000 meteorites per diem. If that holds good, *mutatis mutandis* [illegible]