seed, but is the result of some electrical action producing them spontaneously. The late Duke of Portland used to say they need not sow white clover where bones were used freely; and where the pure white lime is used, clovers are seen without sowing seed. Also, if, as may be seen any season on the roads of Derbyshire, where the roads are repaired with white limestone, the clovers are present by the side of the wheel-tracks. The same may be seen on laying land down to permanent grass. Use farmyard manures, and the coarser grasses are seen; use road-scrapings and compost, and the finer grasses are sure to come. The charlock is an unwelcome visitor; but its removal in corn crops is often worse than the evil itself. 'Let both grow together till the time of harvest.' The seed has more value than some suppose, and when crushed will be found a good tonic. Nothing is given to us in vain."

Comment in this case also is needless. One hardly knows which most to admire in this rich paragraph; the independence of the trammels of the ordinary rules of syntax displayed by the writer; the teleological moral drawn at the end; or the contempt for science manifested in the assertion of the possibility of so highly-organised a plant as the charlock arising "spontaneously" in the ground. When such lamentable ignorance of the very elements of science is displayed by those who should be the leaders, what can we expect from the farmers themselves? Well may we exclaim, *Quis docebit ipsos doctores!*

ALFRED W. BENNETT

London, Sep. 23

ICE FLEAS

THE water flea, *Daphne pulex*, is a well-known inhabitant of rivers and fresh-water lakes, and, being distinctly visible to the naked eye, often attracts the attention of water drinkers. Though a harmless crustacean, this little creature not only excited great interest in parliamentary committees during the last session, but exercised a very powerful influence over the choice of a water supply for the northern capital of Great Britain. The ice flea, if known at all, is certainly less celebrated, and probably by no means likely to be so potent in its parliamentary influence; nevertheless a short account of it may not be wholly uninteresting to the readers of NATURE.

During a recent ramble upon the Morteratsch Glacier, I turned over some of the isolated stones which lie upon its surface partially imbedded in the ice; under many of them I found hundreds of a minute jet black insect, which jumped many times its own length at a single spring, in a manner somewhat resembling the performance of a common flea.* The ice flea is about one-twelfth of an inch long. Viewed through a pocket lens, it was seen to have six legs, supporting a body obscurely jointed like that of a bee, and furnished with two jointed antennæ. The total length of the insect appeared to be about six times its thickness, the antennæ being about one-fourth as long as the body. The insects were not found under every stone, they generally occurred under flattish fragments of rock, presenting a surface of about a square foot, and having a thickness of from 2 to 4 inches. Stones of this size are sufficiently warmed by the sun's rays to melt the ice beneath them more rapidly than it is liquefied by the direct solar beams. A surface of rock absorbs luminous thermal rays better than does a surface of comparatively white ice, and it transmits these rays to the ice beneath it, partly by conduction and partly by radiation from its under surface. The stone thus melts its way an inch or two deep into the ice, forming for itself a kind of basin. Sometimes these cavities are watertight, and then any space between the stone and the walls of its basin are filled with water derived from the melting ice. Under such conditions I have never found any fleas beneath the stone. But occasionally the ice basin is drained, and it was under stones resting in such comparatively dry basins that the insects were found. In all cases nearly the whole of the fleas were found upon the ice, very few being attached to the stones. They were grouped together in shoals, so that probably forty or fifty of them frequently rested upon a single square inch of ice. On removing the stones, the insects were very lively, but this might be owing to their sudden transition from comparative darkness to direct sunlight.

I saw no indications of food of any kind beneath the stones, indeed these insects must have a struggle for existence of a most severe character. Living in an atmosphere the temperature of which never rises above the freezing point, they must be continually exposed to inundations during the day by the stoppage of the drainage of the ice basin, whilst on clear nights severe frosts frequently threaten them with an icy grave. Again, during the day the roof of their habitation is, as it were, continually falling in upon them, and thus constantly exposing them to the risk of being crushed to death; for, as the ice melts beneath the stone, the latter is continually changing its points of support. It may be, however, that the crystalline structure of the ice causes it to melt with a corrugated surface, which provides everywhere valleys of sufficient depth to protect the fleas from destruction by the fall of the superincumbent mass of rock. We have also not to search far for a possible source of food. The cold of the glacier benumbs and kills thousands of insects which alight upon its surface, and bees, wasps, flies, and moths are frequently seen dead upon the ice. Then there is the so-called "red snow," and other allied organisms of similar habits, which may perhaps minister to the wants of this singular insect. Is the ice flea, like its irritating cousin, a nocturnal predatory insect, and does it issue from its dangerous abode at nightfall in search of frozen bees and butterflies? Perhaps some of the entomological readers of NATURE may be already acquainted with this animal, and be able to supply further information respecting it.

E. FRANKLAND

* My friend Prof. Eschenburg, of Zürich, had previously observed these insects on the Morteratsch Glacier, and it was his verbal account of them that led me to search for them.

REMARKS ON PROF. WILLIAMSON'S NEW CLASSIFICATION OF THE VASCULAR CRYPTOGAMS

IN discussing the points at issue between Prof. Williamson and myself, it will be necessary for me to say a few words on stems in general, because we evidently have very different views of the construction of stems; and until we thoroughly understand each other, it is impossible for us to come to any definite conclusions. In a young dicotyledonous stem (see Oliver's "Lessons," p. 112, fig. 67) we find three things: a quantity of cellular tissue surrounded by an epidermis, and near the centre a series of young fibro-vascular bundles. As growth goes on, these separate bundles coalesce and form a central cylinder of united fibro-vascular bundles. These bundles leave a portion of the cellular tissue in the middle of the stem, which becomes the pith. Outside the fibro-vascular bundles we have also a small quantity of the cellular tissue, but it soon becomes to a great extent inseparable from the sub-epidermal cells. Other portions of the cellular tissue remain between the united fibro-vascular bundles, and form the medullary rays. In many stems and in most roots these rays are wanting, and the cellular tissue would therefore be divided into two portions by the united bundles. Each fibro-vascular bundle consists of two portions, which are separated by a layer of cells capable of division, the cambium. On the inner side of the cambium cells we have in general spiral vessels, porous vessels, and wood cells, while on the outer side we have the soft bast and bast fibres. The epidermis is soon thrown off in many cases, and is replaced by layers of cork-cells