spring and of nests and workers in summer is so common that I am tempted to think that the more conspicuous, and therefore more often caught, queens are infertile, and the rewards for their destruction wasted. Perhaps some member of the Association of Economic Biologists will take the matter up?

ALFRED O. WALKER.

Ulcombe, Kent.

IN reference to the letter of Mr. H. V. Davis (NATURE, October 12, p. 109), I may say that in this district ordinary wasps have been decidedly scarce this year. Reports from several other localities are of the same character. Queens, however, were abudant in the spring (May and June), but I think that only a few survived the wet and cloudy weather.

I make a point of cultivating these insects, as they are extremely interesting to watch, and destroy myriads of flies every summer. There were six embryo nests in my garden in May last, but only one (*Vespa vulgaris*) managed to withstand the vicissitudes of the inclement weather. This nest was a weak one, for when I dug it out on September 20 it consisted of four layers of cells, the top one alone being for small working wasps (1000 cells), while the others were exclusively for queens and drones (1450 cells). This proportion is quite exceptional according to my own observation, for I have commonly found the smaller cells greatly in excess of the others. In a much stronger nest (*Vespa germanica*) which I took here on October 6, 1915, there were 12,900 cells, forming ten tiers, and less than a quarter of the former had been devoted to the rearing of queens and drones.

Very few persons will be inclined to attract wasps to reside in their own immediate neighbourhood, but anyone caring to study these insects should make a few little cavities in dry situations early in April. The queens begin selecting eligible positions in that month (average date, April 17). It is certain that wasps are not so aggressive and violent as commonly supposed. They display remarkable industry and activity, for at midsummer they may be observed streaming to and from their homes during a long working day of eighteen hours! In view of the justified agitation against the house-fly in recent years, it is questionable whether the usual spring campaigns against queen wasps should be encouraged. On a bright summer day in 1913 I carefully watched the entrance of a wasps' nest in my garden, and concluded that the insects brought home at least 2000 flies.

W. F. DENNING.

44 Egerton Road, Bristol, October 14.

REFERRING to Mr. H. V. Davis's letter in NATURE of October 12 on the scarcity of wasps, I have taken nests for some years over an area a little less than 1000 acres as follows:—1906, 95 nests; 1907, 61; 1908, 31; 1909, 113; 1910, one (*Vespa rufa*, Linn.); 1911, 85; 1912, 56; 1913, 189; 1914, 21; 1915, 56.

1916: I knew of three *Vespa vulgaris*, Linn., nests, and took one as it hindered ploughing, and in the early part of the season I hived three *Vespa sylvestris*, Scop., nests as there were a very large number of *V. sylvestris* queens about. My hived ones died out before hatching queens (this wasp is always earlier here, and gone before the fruit, and I have never caught it in my house), as did some unhandled nest I heard of. In 1910 the *V. rufa* nest had been scratched up before I got it, and I saw a few *V. vulgaris* workers about the Severn, indicating at least one nest, but actually saw no other nests that year.

RICHARD F. BURTON.

Longner Hall, Salop, October 17.

THE Dartford Naturalists' Field Club this season also experienced a scarcity of wasps; local papers reported the same about Gravesend on the east, and Bexley on the west.

Their nests were very plentiful last year, and so queens were exceedingly plentiful in spring—abnormally so. But later a cold spell nipped those about at the time.

Observers here speak confidently of the persistent hunting of flies by these early queen wasps, out too soon for nectar from flowers, and say the early wasps put down the flies for this summer. Flies were far more numerous last year, and, other things being equal, a beekeeper predicts many flies next summer, because of this season's scarcity of wasps. He remembers such an experience at Green St. Green (Dartford).

On May 27 I saw a note about more wasps than usual at Dudley, a district fairly free compared with the south and west. It was during May when so many early queens were observed here.

S. PRIEST

(Hon. sec., Dartford Naturalists' Field Club).

REFERRING to Mr. Davis's letter, it would be interesting to know if the same dearth of wasps has been noted in the cider counties.

I have caught only two here this season (in jars of beer and sugar placed outside), while last year I trapped hundreds.

C. CARUS-WILSON.

Strawberry Hill, Middlesex, October 13.

Glacial Nomenclature and Scott's Antarctic Expedition.

IN the review of my book, "With Scott—The Silver Lining," in NATURE of June 1, the reviewer, among many kindly remarks, takes exception to my use of the word "riegel." He prefers the English word "bar." I have briefly explained my point of view in the *Geographical Journal* (p. 571, December, 1914), but may be allowed to elaborate it a little.

Webster gives fourteen paragraphs dealing with different meanings of the word "bar." One at least of these—the bar of a river—is a geographic term. Why should the reviewer use the Scotch word "corrie" or the French "cirque" (as I use the Welsh "cwm") if not because—as in my case—there is no English word which is not ambiguous? I believe that there was a movement in Oxford to standardise geographic nomenclature. I sent in a memorandum in 1913, but have heard nothing of it lately.

May I refer briefly to further Antarctic questions raised in the review? The "catenary curves" illustrated in my book are not "ordinary denudation curves" in my opinion. They are common in the Alps (*e.g.* above Hospenthal, on the St. Gothard Road), but not in regions of normal erosion. An ordinary water-cut valley only a few hundred yards across would certainly not exhibit the smooth catenary curve of the small empty Antarctic valleys.

The small scale of the photograph of the *Discovery* Hut (p. 189) has, I feel sure, led the reviewer into a natural error. My colleague, Debenham, is emerging *viâ* the window, since the door alongside was then blocked by ice. I am certain that Prof. J W. Gregory's hut could not have been satisfactorily erected so that the "support" shown in the figure could have been sunk in the ice. Under the latter condition the door sill would have been 3 ft. below ground-level.

The problem of the "origin of the glacier valleys"

through the Royal Society Range is to a large degree answered by what I call the "palimpsest theory" (v., p. 175). In effect the outlet glaciers flow down notches cut by earlier headward (or cwm) erosion. I hope to publish shortly a mass of evidence and illustration in support of this sequence in glacial erosion.

GRIFFITH TAYLOR.

Meteorological Bureau, Melbourne, July 26.

Muret Sanders's "Encyclopädisches Wörterbuch" gives "riegel," in addition to the various ordinary meanings of the word "bar," including a bar of soap, eleven other meanings. What advantage is there in the use of a German term over an English term when both have equally varied meanings? The term "riegel" is especially overloaded, as in geography, according to Grimm's "Deutsches Wörterbuch," it is used in South Germany for a "kleine Anhöhe, steiler Absatz eines Berges," and he also quotes its use for a watershed.

Ordinary water erosion would certainly produce a slope with catenary curves if it is operating on suitable rock and under suitable conditions.

The conclusion that the *Discovery* Hut was not erected as designed was not based only on Dr. Taylor's photograph, and there could have been no difficulty in managing the supports on any surface of ice which had not so steep a slope as to be otherwise unsuitable.

The more detailed information regarding the origin of the glacier valleys which Dr. Taylor obviously collected may, as was remarked in the review, explain their origin. Dr. Taylor's further publication will be awaited with interest. THE REVIEWER.

ANNEALING GLASS.

EVERYONE who makes chemical apparatus by blowing glass practises annealing in a rude way by allowing the glass to cool slowly by g'adual removal from the flame, or by the use of a smoky flame. In glass works more systematic annealing is effected by slow passage through a long chamber wherein the temperature falls from the incoming to the outgoing end. In the manufacture of optical glass of many different qualities the question of annealing is one of the first importance, as they differ so much in fusibility. Messrs. Hilger have after a careful investigation found the means of arriving at the maximum temperature necessary, and also the necessary rate of cooling, which may progressively become more rapid. Optical glasses may differ as much as 200° C. in the maximum necessary temperature, which temperature may be a long way below any visible softening point. It is desirable not to exceed the necessary temperature, as the very slow cooling at the higher temperature leads to great loss of time.

The method adopted by Messrs. Hilger for testing different specimens of glass is interesting as an example of a physical investigation made with a view to practically useful results. The principle of the method can be described very shortly. Fig. 1 shows a bar of glass supported as a cantilever, and carrying a load. Its edges are ground and polished in the form of two parallel planes. This is set up in an electrically heated muffle, with means for observing the temperature electrically. Polarised light broken up into interference bands by passage through a Babinet's compensator is passed through the glass, and when this is loaded the bands become inclined as shown in the figure, illustrating how perfectly the stress, whether of compression or extension, is proportional to the distance from the neutral axis. If the load is allowed to rest on a support in consequence of the slight yielding of the glass, the rate at which the bands change from the inclined to the straight position can be observed for any known tempera-

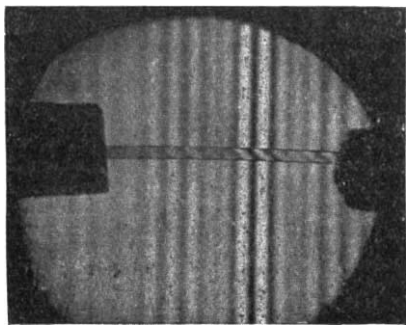

FIG. 1.

ture. Fig. 2 shows two specimens undergoing a change of temperature which sets up strains from the difference in temperature between the interior and the exterior. That the two specimens are very different is only too apparent.

By watching the bands in specimens of glass Messrs. Hilger are able to ascertain when the glass is hot enough to allow the internal strains to be relieved in a convenient time, and whether as the glass cools internal strains are avoided by

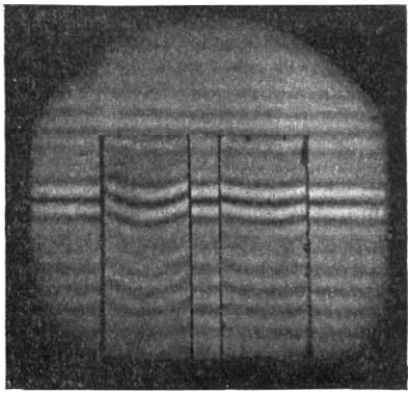

FIG. 2.

sufficiently slow cooling. After a point is reached at which the glass has lost all viscosity the cooling may be accelerated, and though the bands then become curved they straighten out again when ultimately the temperature is equalised. There is no hard-and-fast point at which the glass ceases to be viscous, and so there is a progressive permissible increase in the rate of cooling. Messrs. Hilger have thus shown how annealing may be effected perfectly in the minimum of time. Though