particular cases, but only to mention an impersonal criterion for showing that the generic determinations of bees in the lists cited were erroneous.

At first he takes the second of my alternatives and holds that the bees differ from all of the other groups of insects, and even among plants are only comparable with the Poales. Then he changes about, makes the erroneous assumption that the bees and Lower Aculeata were more completely represented in the local list, and arrives at the mistaken conclusion that such a condition would explain the discrepancy between the averages of these insects and the others.

Stevens compares *Andrena* with *Carex*. The so-called genus *Andrena* reminds one of the time when all of the owls were referred to *Strix*. It would not seem so large if the sexes were not described as distinct species. In a recent paper only 4.6 per cent. of the so-called species were described from both sexes. If one is so careless of his entomology and diction as to say species when he means sex, what is to keep him from saying subgenus or quidnunc-group instead of genus? One who ignores the fact that bees have two sexes is not competent to distinguish any genera except those based on characters common to both sexes. If you should disregard the secondary sexual characters and the habits of the females, how well could you understand the classification of the Hymenoptera in general.

Small divides *Carex* into two subgenera and 34 what-d'ye-call-'ems—named groups with subfamily, family, ordinal and other endings. One might like to know what categories the organisms form, not how they are to be forced to fit preconceived categories. The genus seems to be regarded with superstitious reverence when it contains 34 groups of the second order. Even the analogy of the Poales is against the bees. In the Fargo flora the Poales stand 2.3 against a general average of 1.8, while in the Carlinville list the bees stand 6. 5 against an average of 1.7.

Compared with the general average the bees and Lower Aculeata show a great discrepancy in both lists without regard to their percentages in the composition of them. The Coleoptera, respectively 33.7 and 10.6 per cent., approach the average in each list. In the local list the Coleoptera are quite fragmentary compared with the Diptera, but the average is about the same. The list of Rhopalocera, which is as complete as that of the bees, shows an average of 1.4 to the bees 6.5, while the Heterocera, which are quite fragmentary, average 1.2. The Bombyliidæ, Conopidæ, Syrphidæ, Tachinidæ and Muscidæ, in which the local list is quite complete, show 1.7 while the other Diptera average 1.6. The 437 local entomophilous flowers on which insect visitors were taken average 1.6 while the 520 plants of the Fargo flora average 1.8.

Although Stevens argues against small groups he says that he believes in the recognition of them, but he doubts the necessity of forcing them upon every one. The statement that neglected groups will be subdivided about like those which have been more thoroughly studied hardly involves an attempt to force small groups upon any one. You may say that a river runs south without trying to force the water on those who live down stream.

CHARLES ROBERTSON
CARLINVILLE, ILLINOIS

GEOMORPHOLOGY

TO THE EDITOR OF SCIENCE: The letter from Professor John L. Rich in your issue of January 11, 1918, escaped my notice at the time and my attention was not drawn to it until very recently. Hence this belated reply.

I agree thoroughly with Professor Rich that geomorphology has an interpretative geological value, and I admit that, for the sake of economy of space, it may be necessary sometimes to compress the geographical aspect of a geomorphological description and its geological interpretation into a single paper from which the geographer and the geologist will each attempt to pick out the points that interest him. The introduction of certain geological dates into a paper with such a double purpose is excusable, but it is the thin end of a wedge which may lead to much obscurity.

The artifice of placing geological names in

footnotes, where they do not break the continuity of the descriptive text, and of adding further geological information in an appendix is useful in drawing attention to the geological value of an interpretation of the physiography in a paper written primarily to explain and describe the land forms. This method I adopted in "The Physiography of the Middle Clarence Valley, New Zealand."[1]

In the case of my paper "Block Mountains in New Zealand," to which Professor Rich refers, the age of the covering strata in Central Otago is uncertain within fairly wide limits. The statement that they are probably Oamaruian but possibly Wanganuian would not convey much definite information to American readers. When I was preparing the paper for publication the temptation to discuss the age question was strong, and I yielded to it. Realizing that the discussion would be out of place in the body of the paper I placed it in an appendix, which, however, the editor wisely omitted.

This article was not written with a dual purpose. The geological significance of the land forms of Central Otago, as well as the closely related forms throughout New Zealand had already received full attention in a paper entitled "The Structure and Later Geological History of New Zealand," published in the *Geological Magazine*.[2] This and "Block Mountains in New Zealand" were in preparation at the same time, the one frankly geological, the other geographical. As such the latter was intended for publication in a geographical periodical and was offered to the Royal Geographical Society, which was unable, however, to find space for it in its *Journal*.

C. A. Cotton
Victoria University College,
Wellington, N. Z.

"A WAVE OF LIFE"

An interrelation of organisms somewhat suggestive of Hudson's "wave of life" was observable about the University of Montana Biological Station on Flathead Lake the past season.

During the summer of 1917 flowers bloomed luxuriantly about the station grounds, and humming-birds and butterflies visited the flowers very commonly. Rodents were present in normal numbers, but attracted no particular attention.

Conditions were markedly changed during the summer of 1918. For unknown reasons the rodents became very abundant. Pine squirrels and chipmunks were everywhere present. Spermophiles appeared on the station grounds for the first time in the history of the institution. The chipmunks quickly cleared the ground of flowers and ascended to the tops of trees to strip the honeysuckle vines of their blossoms. Deprived of their natural food in this vicinity humming-birds were rarely seen and butterflies were very uncommon. Pine squirrels kept the ground under the pine trees well strewn with pine cones, but the effect of this inroad upon the pine cones was not so apparent upon other forms of life.

Weasels, which were not observed about the station the preceding summer, were seen several times during 1918. Great horned owls hooted at night in the nearby tree tops. These birds had not been reported for 1917.

G. B. Claycomb
University of Illinois

QUOTATIONS

THE PHYSIOLOGY OF A WORKING DAY

Gradual reduction of the hours of labor from ten or nine to eight, and now to seven or six, must have made many people wonder whether some scientific basis might not be found for the hours which should be worked in various trades. Major A. C. Farquharson raised the matter in the discussion on the second reading of the Ministry of Health Bill. Speaking as one who had spent the greater part of his professional life in the service of the miner, he expressed his astonishment that members of the House of Commons should be so ready to put forward the idea that the number of hours a man should work day by day was to be settled by the arbitrary

[1] Geog. Jour., vol. 42, 1913, pp. 225–46.
[2] December 6, vol. 3, 1916, pp. 243–249, 314–320.