gradually but surely, the natural enemies will also spread. In the course of time, almost imperceptibly, they will gain the ascendancy, and the coccid plague will cease, never to return unless through the importation of a new sort of coccid. Thus it may even happen in some cases that a rigid quarantine, after a pest has arrived, may be harmful, preventing natural enemies from following it. These latter may, however, be brought in by entomologists, through special permission, provided they have been found and recognised.

There is some proof that this is not mere speculation. I wrote to Dr. L. O. Howard, who has long paid special attention to the parasites of Coccidæ, and he directed my attention to a study he had made, comparing the scale-insect parasites of the United States (Chalcidoidea) with those he had studied and described in 1880. There was no doubt that in the years since that date the parasite fauna had changed owing to the introduction of many foreign species, which had in some cases supplanted native ones. Furthermore, the recent researches of Garcia y Mercet in Spain, and Silvestri, Masi, and Paoli in Italy, indicated the existence in great numbers, in the Mediterranean region, of Aphelinine parasites apparently unknown there seventy-five years ago. Last year, when I visited the Melbourne Botanic Garden (which has about 16,000 species of plants growing in the open), Mr. St. John informed me that there were not nearly so many coccids on the plants as formerly. This may partly be due to native enemies; thus the Red Wattle bird keeps the fluted scale (*Icerya purchasi*) in check; yet I suspect it may also be due largely to the spread of foreign parasites.

Similar-looking coccids may have quite different natural enemies. The citrophilus mealy-bug (*Pseudococcus gahani*), though an ordinary-looking species, was not controlled in California by the many enemies of the native American mealy-bugs. Now, after an extended search, *Pseudococcus gahani* has been found apparently native in Australia, and two species of Hymenopterous parasites, a Dipterous parasite, two kinds of Coccinellid beetles, and a Chrysopa have been observed to keep it within bounds in that country. These have now been taken to California, and there are already indications of favourable results. California's plant quarantine would have prevented them from coming over accidentally, and in any case the deliberate work of the entomologists is infinitely superior to the slow operations of chance.

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Variation of the Intensities in the Helium Spectrum with the Velocity of the Exciting Electrons.

RECENTLY, Peteri and Elenbaas (*Zeits. f. Phys.*, **54**, p. 92; 1929) have published curves of the intensity variations of the helium lines when the velocity of the exciting electron steam is altered. We have been working on the same subject, and since our results do not agree with theirs, it seems worth while to give a preliminary account of them.

We also use a photographic method of measuring the intensities, but the apparatus for exciting the light is different. A narrow electron beam in helium at 0·024 mm. pressure passes into a field free box and produces a narrow streak of light. An image is thrown on to the spectrograph slit and runs perpendicular to it. We integrate the intensity over the length of the spectrum lines and subtract the background which is due to secondary excitation. In this way we completely avoid errors due (1) to secondary excitation, and (2) to the variation of the spatial distribution of the electron beam with the applied voltage.

The results for the lines 3889 ($2^3S - 3^3P$) and 3965 ($2^1S - 4^1P$) are shown in Fig. 1. The scale for the two lines is arranged for the maximum of the two curves to be equal. The results of the Utrecht workers are shown dotted for comparison. We cannot explain their curves except by the supposition that a large fraction of the light from their tube was due to excitation by secondary electrons.

The interesting feature of our curves is the extremely different behaviour of the singlet and the

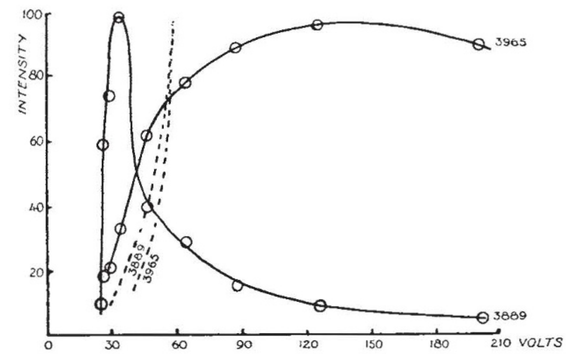

FIG. 1.—Intensities in the helium spectrum.

triplet lines. This is a general characteristic of all the lines, though individual cases show minor variations. The following conclusions may be stated.

(1) For high exciting velocities, the triplets vanish in intensity compared with the singlets. This has been predicted theoretically by Oppenheimer, and had previously been found experimentally by Hughes and Lowe (*Proc. Roy. Soc.*, A, **104**, p. 489; 1923), with whose results ours agree very well in general.

(2) For low exciting velocities, the singlets are weak compared with the triplets. This is a new result. Since the normal state of He is a singlet state, this seems to indicate for low velocities a very close coupling of the spin of the exciting electron with the spins of the electrons in the atom.

There is another interesting point of dissimilarity between the singlets and triplets. We find that while the light of the triplets is confined closely to the electron beam, the light from the singlets tends to spread away from it. This makes the intensity determinations of the singlets somewhat arbitrary. We are not at the moment prepared to discuss the cause of this behaviour as the investigations are not yet complete.

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The Longitudinal Distribution of Photoelectrons.

THE new quantum mechanics has completely resolved the problem of the photoelectric effect. In fact, Wentzel (*Zeit. für Phys.*, **40**, 574; 1925: **41**, 828; 1927) and Beck (*Zeit. für Phys.*, **41**, 443; 1927) have succeeded in justifying theoretically the well-known Einstein equation; and the more complete treatment of Sommerfeld has permitted the calculation of the dissymmetry of the photoemission, that is, the experimental fact that the forward emitted electrons are in a greater number than the backward ones. Sommer-