products, acetone, etc., from the kelps of the Pacific coast.

DR. L. H. BAILEY, Mrs. Bailey and Miss Bailey are preparing to leave Ithaca at the end of this month for a tour of the Far East to last the greater part of a year.

ROALD AMUNDSEN has definitely postponed the execution of his plans for an expedition to the north pole until after the war. His ship was almost equipped for the trip, which was to have lasted three or four years, and the crew had been hired; but the money difficulties proved insuperable. The necessary expenses of the expedition in consequence of war prices have mounted from $135,000 to double that figure.

THE annual meeting of the Brooklyn Entomological Society was held on January 13 and the following officers were elected for 1917: President, W. T. Bather; Vice-president, W. T. Davis; Treasurer, C. E. Olsen; Recording Secretary, J. R. de la Torre Bueno; Corresponding Secretary, R. P. Dow; Librarian, A. C. Weeks; Publication Committee, J. R. de la Torre Bueno, C. Schaeffer and R. P. Dow.

DR. JAMES R. ANGELL, of the University of Chicago, is giving a course of lectures on "The Makers of Modern Psychology" on the Spencer Foundation at Union College.

A COURSE of twenty-four lectures on ore deposits is being delivered before the department of geology of Columbia University by Professor John D. Irving, professor of economic geology, Sheffield Scientific School, Yale University.

PROFESSOR F. J. METZGER, of the department of chemical engineering, Columbia University, has resigned his position to accept the position of manager of chemical development, with the Air Reduction Company, New York.

## UNIVERSITY AND EDUCATIONAL NEWS

THE late Dr. John A. McCorkle had set aside in trust bonds of the market value of $50,000 which became payable to the Long Island College Hospital upon his death. A committee of prominent citizens, headed by the Honorable Edgar M. Cullen, is endeavoring to raise an equal amount as a memorial fund to Dr. McCorkle.

A GIFT of $50,000 to the principal of the alumni fund, subject to an annuity, from a graduate of the class of 1867, Yale College, was announced at the last meeting of the corporation. This is the second gift of like amount and under similar conditions that has been made to the credit of the class of 1867 in the alumni fund. There has also been received, from Robert W. Kelley, '74, class agent and a director of the fund, $125,000 (subject to an annuity as to four fifths of the amount), the whole to be added to the Yale Alumni Fund as an addition to the permanent memorial fund of 1874.

DR. WILLIAM WISTAR COMFORT, professor of the Romance languages and literatures and head of the department at Cornell University, has been elected president of Haverford College. He will succeed Dr. Isaac Sharpless, who will retire after completing a service of thirty years in the Haverford presidency.

J. O. RANKIN has resigned as agricultural editor at the Missouri Station to become associate professor of agricultural economics at the Iowa College, and is succeeded by M. N. Beeler, agricultural editor at the University of Florida.

DR. RAOUL BLANCHARD, professor of geography and director of the Institute of Geography at the University of Grenoble, has been appointed exchange professor at Harvard for 1916–17. His term of service will fall in the second half year.

DR. V. A. COULTER, Ph.D., has been appointed assistant professor of chemistry in the University of North Carolina.

## DISCUSSION AND CORRESPONDENCE

### NEGATIVE SURFACE TENSION

IN a recent number of SCIENCE (November 24, 1916) Professor W. A. Patrick in a note on "Ostwald's Handbook of Colloidal Chemistry," expresses doubt as to the existence of negative surface tension, and suggests that it

can scarcely be conceived without assuming a force of repulsion instead of attraction between molecules of the liquid.

But he surely can not mean to question the existence of negative surface tension at a surface *between a liquid and solid,* for how otherwise are we to explain the most familiar facts in capillarity. Is it not negative surface tension which causes the water to rise in a capillary tube, or against a glass wall, and causes a drop of oil to expand indefinitely over a glass plate? Is it not the greater negative surface tension in the oil-glass surface which causes the film to expand against the contractile force, or positive surface tension of the oil-air surface?

Nor does it appear to be necessary to suppose a repulsive force between molecules of the liquid in order to account for the existence of such a negative tension, for if the resultant force of attraction on a particle of liquid near the surface, due to all particles on both sides of the surface lying within the range of sensible molecular attraction, is directed away from the surface and towards the interior of the liquid, the particle will tend toward the interior and we shall have positive surface tension but if the resultant attraction is toward the surface there will be negative surface tension.

In case of an air-liquid surface the attraction of neighboring liquid particles upon a particle in the surface is so much greater than any opposing outward attraction by adjoining air molecules that the first condition holds and the surface tension is positive. While at a glass-oil surface a particle of liquid near the surface may be supposed to be more strongly attracted by the neighboring glass molecules than by the oil molecules in its vicinity, in which case the resultant attraction is toward the glass, the potential energy of a liquid particle is less at the surface than in the interior of the liquid, and the surface tension is negative.

When liquid comes against liquid the case is complicated by the mobility of particles on both sides of the boundary. It seems probable, however, taking an oil-water surface as an example, that if the resultant attraction on an oil molecule at the surface is directed across the boundary from the oil side toward the water, that a water molecule at the surface being in the same situation with respect to the surrounding molecules will be urged in the same direction. In other words, we can hardly imagine a particle of one sort in the surface as being drawn in one direction by the attraction of all the surrounding particles on both sides of the surface, while a similarly situated particle of the other sort would be drawn in the opposite direction.

We may assume then that at a surface between two liquids, particles on one side are urged away from the surface, while those on the other side are urged toward it. That is, there are two influences, one tending to contract the surface and the other to expand it. If the first is predominant there is positive surface tension, this is the ordinary case where diffusion does not take place, as with water-oil or water-mercury.

If the second is predominant the surface tends to expand indefinitely, and the limit would seem to be reached only when one liquid is uniformly diffused throughout the other. In this case diffusion is to be expected also from the consideration that if particles in the one liquid are drawn so powerfully towards the other as to force the expansion of the second liquid in opposition to its contractile tendency, it seems probable that they will be drawn actually *into* the second liquid and thus the integrity of the surface be destroyed. We conclude, therefore, that *a positive surface tension is to be expected between all liquids that do not interdiffuse.*

If the particles in a colloid solution are to be regarded as solid, we may expect to find cases where the surface tension is positive and other cases where it is negative. Where it is positive there will be a tendency to flocculate, for as two colloid particles come together liquid particles move out from between them into the interior of the liquid, and the capillary region surrounding the particles is thus decreased in volume, and the potential energy of the system is diminished. When, on the other

hand, the surface tension is negative at the surface of a colloid particle, there will be no flocculation, and the particles will not approach each other near enough to crowd the liquid out of the region of surface energy around either particle. This, of course, does not imply that there is any tendency in the latter case for the colloid particles to remain in equilibrium equally diffused throughout the liquid.

ARTHUR L. KIMBALL
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## THE WHITE PINE BLISTER RUST; DOES THE FUNGUS WINTER ON THE CURRANT?

IN the work carried out in the Province of Ontario during the last two years on this disease, strong suspicions have been aroused that the fungus may in some cases pass the winter on the currants themselves. Several lines of evidence support these suspicions.

1. The commencement of the currant stage each spring here and there over large areas, without any apparent relation to the pines therein.

2. The similar yearly recurrence of the currant rust in one particular district ten miles by four miles in extent. In this area (*a*) the rust outbreaks do not bear any apparent relation to the pines; (*b*) the pines are very few in number; (*c*) many lots of these pines are small and their freedom from disease has been established; (*d*) the evidence from five lots of these young pines growing close to infected currants indicates that the rust was not introduced into this area until 1914, and that therefore the prevalent currant stage of 1915 and 1916 could not be due to pine blisters, which have not yet had time to mature.

3. The finding of six cases of the currant stage early in the year from one to two miles distant from any possible source of pine infection.

4. The occurrence of currant rust in 1916 on two adjacent plants in a large plantation. Early in the year these two only were rusted. The only four plants which were badly diseased here in 1915 included these two.

5. The occurrence of a rust outbreak on a plot of one hundred black currant plants which were badly rusted in 1914, and which had been set out in a disease-free neighborhood in the spring of 1915 to test hibernation.

A hypothesis is advanced which gives a reasonable explanation of the suspected hibernation. The rust often causes early defoliation of the currant plants, and this defoliation is followed by a secondary production of foliage, due to the development of winter buds. The general occurrence of the rust on these secondary leaves suggests that, allowing for the two weeks' incubation period, the infection must take place very early in their growth, and the question naturally follows: can such started buds be infected at such an early stage in their development that if winter conditions set in soon after, the buds are still capable of surviving?

W. A. MCCUBBIN
DIVISION OF BOTANY,
EXPERIMENTAL FARM SYSTEM,
DOMINION OF CANADA,
November, 1916

## PAMPHLET COLLECTIONS

TO THE EDITOR OF SCIENCE: I note in SCIENCE for November 24, an article by Tracy I. Storer from the University of California on "The Care of Pamphlet Collections" in which a type of cardboard case open at the back only and "not larger than $12 \times 8 \times 2\frac{1}{2}$ inches" is recommended for this purpose. Permit me to state that such cases differing only in size—mine are $11 \times 7 \times 3$ inches—have been in use in my department since 1904. Several other departments in the university had such cases made after my design and they have been in rather general use here since. I do not remember whether the idea is original with me or not. These cases are arranged alphabetically by authors and the card index is by subject with the catch word first on the card.

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## INDUSTRIAL LABORATORIES AND SCIENTIFIC INFORMATION

TO THE EDITOR OF SCIENCE: The undersigned committee on engineering of the General Committee on Research, of the American Associa-