currents in mountain valleys. The fact of the nocturnal descent of air on mountain sides and along the floors of mountain valleys is familiar, and in some cases a deepening of the current during the night has been noted. The present report describes the method of occurrence of the lateral drainage only. The observer found that during the daytime, provided the sun shone, a distinct set of the air toward the valley bottoms was noticeable in the shadows of cliffs, while in the sunlight no movement was discernible. One case, where a vertical cliff cast a well-defined shadow, showed that by going even so short a distance as twenty-five feet, one moved from uncomfortable heat into a cooling breeze. This descent of air in the shadows was undoubtedly due to a cooling similar to the more often observed nocturnal phenomenon, though on a very small scale.

A similar control over *nocturnal* winds was noted by the writer a few years ago near the foot of the Illecillewaet Glacier, in the Canadian Selkirks. The valley of the Illecillwaet River, which flows northwestward from the glacier, is very steep walled. This, with the presence of the ice, affords ideal conditions for nocturnal downcast winds. About sunset on the day in question, the writer was standing near the foot of the glacier, but somewhat upon the east side of the valley. The air was perfectly calm, and the temperature in the full sunlight gave no indication of the presence of the ice. The west side of the valley was already in shadow. As the edge of this shadow crossed the valley floor, a distinct movement of foliage within the shadow became evident. The zone of movement widened, keeping pace with the advance of the shadow; and as the edge of the latter passed the observer on its way up the east wall of the valley, the edge of the zone of foliage movement lagged a hardly perceptible distance behind, and was seen to move up the slope to the limit of the bushes. Possible movement beyond this point was rendered invisible by the distance and character of vegetation on the higher slopes. Almost at the instant of the passing of the shadow edge, a gentle puff of cold wind down off the glacier announced the beginning of the nocturnal descent of air. Half an hour later, at the hotel some distance down the valley, the night wind was already blowing moderately and the temperature had dropped many degrees.

It is improbable that the upper limit of foliage movement indicated the depth of the down-valley current in "mid-stream." The rapidity of ascent of the shadow would call for the sudden beginning of movement of a mass of air so large that it could not possibly have been cooled thus quickly throughout. Instead, the upper limit of a relatively thin sheet of cooling air which was moving more or less directly toward the valley bottom, was indicated.

Observation may prove that this lateral movement, while showing near its upper limits a fairly direct downward course, turns more and more obliquely down the valley under the influence of the drag of the air-stream proper. Careful study might also show whether the surfaces of such down-valley currents assume the slight convexity noted in the case of water-streams, or whether the constant lateral accessions of air tend to produce a diminishing concavity of surface as the stream slowly deepens during the night.

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HARVARD UNIVERSITY,
January 6, 1910

SCIENTIFIC BOOKS

Outlines of Chemistry: A Text-Book for College Students. By LOUIS KAHLENBERG, Ph.D., Professor of Chemistry and Director of the Course in Chemistry in the University of Wisconsin. New York, The Macmillan Co. 1909. Pp. vii + 548. $2.60 net.

In a clear and interesting style the author here presents such a course in elementary chemistry as was almost universally taught a generation ago and still keeps its place in many of our largest institutions of learning. Professor Kahlenberg has accomplished his purpose with a high degree of success, but we may nevertheless inquire with all seriousness whether this purpose is consistent with the

most efficient training of chemists as technicians and as thinkers.

Chemistry, it must be admitted, is still far from being an exact science, but an enormous stride has been made in this direction during the last few decades as a result of the work of such men as Guldberg and Waage, Gibbs, van't Hoff and Arrhenius. The exact laws and theories developed during this period constitute powerful weapons of research which are the birthright of the new generation of chemists. To withhold all knowledge of these illuminating ideas even in the most elementary course in chemistry is unjust to the student and to the science.

If the author had omitted all theory from his book and made it frankly descriptive, there would be little to criticize and much to praise, but this volume contains fully as much of chemical theory as the average teacher would consider it desirable to introduce in a single course. However, the laws and theories with which the reader of Kahlenberg's book will become familiar are chiefly limited to those which had been accepted a generation or more ago.

It was to be expected from one holding Professor Kahlenberg's pronounced views that the great modern developments in the study of solutions, especially of aqueous solutions of electrolytes, would receive but scant attention, but other great advances in chemical theory suffer from an equal neglect. The important ideas of heterogeneous equilibrium introduced by Willard Gibbs, which have been brought into simple pedagogic form by various teachers, notably by Ostwald, are not only ignored, but statements are made which flagrantly violate all phase-rule doctrine. The student can not fail to acquire fundamentally erroneous conceptions from such a paragraph as the following:

> Suppose a block of ice and one of common salt be placed in contact with each other; we note that the salt and ice gradually disappear, forming a brine. Evidently the brine has quite different properties from those of either the salt or the ice. Moreover, there was a marked change of temperature, in this case a cooling effect, as the salt and ice acted on each other. Furthermore, a contraction ensued, for the volume of the brine is less than the sum of the volumes of the blocks of ice and salt. Again, as a block of ice and one of paraffine, or one of salt and one of paraffine, for example, do not act on each other at all when brought into contact, it is clear that the action between ice and salt takes place because of the specific nature of the substances. Furthermore, it has been found that below —22° C. ice and common salt no longer act on each other, just as iron and sulphur do not act on each other at ordinary temperatures. Raise the temperature sufficiently in each case, and at a certain definite point action begins.

In this paragraph the author shows also his attitude towards the important subject of reaction velocity. His comparison of the eutectic point of salt and water with the "definite point" at which sulphur and iron begin to react might be regarded as a mere slip of the pen were it not for the fact that similar ideas are advanced in the discussion of ignition points and kindred phenomena. One of the most serious fallacies concerning reaction velocity is not only affirmed but italicized on page 23.

> The rate with which a chemical reaction proceeds is proportional to the chemical affinity that comes into play.

If this were the truth we may be sure that none of us would be alive to announce it, for the affinity of our tissues for the oxygen of the air is enormous compared with that which comes into play in the majority of vital processes.

Other instances of too much theory might be cited. For example, the statements concerning the nascent state and the mechanism of oxidation and reduction processes are, to say the least, unproven. In discussing inorganic compounds frequent use is made of graphical formulæ of very questionable character. Mention is nowhere made of the simple gas laws, but an amazing polemic chapter is devoted to theories of solution and osmotic pressure.

The principle of mass action is given friendly though somewhat scant discussion. Owing to the author's unwillingness to adopt the ionic view, he has been unable to apply

this principle to the large number of phenomena in aqueous solutions which so well illustrate the laws of chemical equilibrium.

The student who depends upon this textbook may acquire a large number of useful chemical facts. He will be attracted by the lucidity and stimulated by the enthusiasm of the author, but he will nevertheless be seriously handicapped when in any field of chemical endeavor he enters into competition with men who are trained in the use of all the tools of modern chemistry. GILBERT N. LEWIS

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January 20, 1910

Iagttagelser over Entoparasitiske Muscidelarver hos Anthropoder. Af I. C. NIELSEN. Copenhagen. 1909. Entomologiske Meddelelser, R. 2, Bd. 4 (1909), with 4 plates.

THE above paper consists of 110 pages in Danish of investigations of muscid-larvæ entoparasitic on arthropods, exclusive of careful explanations in both English and Danish of the plates and over five pages in English giving a summary of the more important results announced. It shows much painstaking work, and the author is to be highly commended on the very valuable results obtained.

After reviewing the greater part of the literature, eight species are treated in detail, descriptions and figures being given of the maggot stages and puparia, to which are added many data on host relations. The one great feature of the work is the establishing of definite characters in the pharyngeal skeleton of the eight species studied, whereby the maggot stages can be accurately determined. It is reasonable to suppose that the characters given by the author will hold good through a large part of the superfamily Muscoidea. Excellent figures are given of the pharyngeal skeleton in its different stages, and the author is undoubtedly correct in assuming that there are but three maggot stages in the majority of the Muscoidea. Some exceptions to this rule may yet be found, though it must be admitted that the probability of such is remote. Investigations carried on by the bureau of entomology at the gipsy moth parasite laboratory in Massachusetts indicate that much further study of the subject is needed.

The spiracles of the maggot, both anterior and posterior, have been carefully studied and figured by the author. The determinations of the eight species above mentioned were made with the aid of Mr. H. Kramer, the German specialist in Tachinidæ. I can only say that two of them, *Tachina larvarum* Linn. and *Carcelia gnava* Meig., are not the species handled by us under those names at the laboratory, and we have the authority of Drs. Kertesz and Handlirsch for our determinations. Nielsen's *larvarum* deposits maggots, while ours deposits eggs. As further evidence that we are right, we know that the American and Japanese species of *Tachina* deposit eggs. The anal stigmata of the puparia of our *larvarum* and *gnava* differ conspicuously from those figured by Nielsen under these names. These points only show the difficulty of arriving at uniform determinations in the Tachinidæ with our present knowledge; careful study and comparison of types, even of the most common species, must be made.

Another point of importance brought out in the paper is the fact that the chitinous funnel of the maggot is not an actual part of the latter's integument, but is formed to a large extent from the integument of the host. The author shows that this funnel is present in all three stages of the maggot of certain species, but we know that other species are without it in the first stage.

Doctor Nielsen is certainly mistaken in believing that *Compsilura concinnata* does not penetrate the skin of the caterpillar with its piercer at the moment of larviposition. Our investigations, including actual observation of the living flies and dissection of both flies and hosts, prove conclusively that such penetration takes place. There is a considerable group of species, both European and American, that have this habit. Mr. William R. Thompson has recently secured thorough demonstration of the fact with *concinnata* at the laboratory, thus verifying conclusions arrived at from a