author's theory, the better-seeing right eye would determine the use of the right hand (the center for the muscles of which is in the left hemisphere) in preference to the use of the left (the center for the muscles of which is in the right hemisphere). But, now, why should it? The macular region of the right retina is connected with the right hemisphere by just as short and pervious a neurone path, as with the left hemisphere. The associative neurones between the visual and motor centers of the right, are just as short and pervious as those of the left, hemisphere and, for objects situated in front of the infant, the left hand may be used as conveniently as the right. Under these circumstances, in which there are two possible paths with no advantage of one over the other, why should the nerve impulse traverse, as a matter of fact, one chain of neurones rather than the other? In the opinion of the reviewer, Dr. Gould's theory fails to answer this question. And it is only by answering this question that any theory of the dependence of motor asymmetry upon sight can hope to succeed.

H. C. STEVENS
UNIVERSITY OF WASHINGTON,
SEATTLE, WASH.

Colloids and the Ultramicroscope, A Manual of Colloid Chemistry and Ultramicroscopy. By RICHARD ZSIGMONDY. Authorized translation by JEROME ALEXANDER. Small 8vo, xii + 245 pages, illustrated. New York, John Wiley and Sons. Cloth, $3.00.

The study of colloidal solutions has justly received considerable attention in recent years. The appearance of the German edition of Professor Zsigmondy's book in 1905 was warmly welcomed, for besides being written in the admirable spirit of a careful student, it presented results obtained by means of a new apparatus, the ultramicroscope, which opened up a new method of attack of some of the perplexing problems of solutions.

The ultramicroscope, the chief feature of which is that by means of a special contrivance the sun's rays are concentrated so as to produce a very powerful light upon the material to be examined under a compound microscope, has enabled investigators to see minute particles hitherto invisible. Thus this instrument is of value not only in studying suspensions and colloidal solutions, but also in investigating all kinds of extremely finely divided material, and so the book is of greater significance than its title would indicate. Indeed, the results that have already been obtained by means of the ultramicroscope go far toward strengthening the probability of the atomic and molecular theories of matter.

The book is especially valuable in that it opens up new avenues of experimental investigation, and it is to be hoped that the methods of ultramicroscopy may be still further improved in the near future. During the interval between the appearance of the original and the translation, additional facts concerning colloids have been accumulated by means other than the ultramicroscope; these have not been considered. But it is to be remembered that the volume does not claim to be an exhaustive treatise on colloids.

To most chemists and physicists the work of Siedentopf and Zsigmondy is perhaps already familiar. It is to be hoped that this translation of the latter's book will be read by many others, particularly by those engaged in biology and applied chemistry. The book contains two colored plates not in the original, and also some minor additions to the text. The translator has done his work well; though a less rigid adherence to the letter of the original would have resulted in better idiomatic English. The book is printed upon good paper, the type used is excellent, and the cloth binding is neat, but the price is rather high.

LOUIS KAHLENBERG

SPECIAL ARTICLES

ANOTHER EXPLANATION OF THE HARDINESS OF GRIMM ALFALFA

IN the issue of SCIENCE for December 18, 1908, attention was called to certain points in connection with the history of Grimm alfalfa in Minnesota. In that article the well-known hardiness of this strain was attributed to acclimatization, subsequent to its introduction in

this country in 1857. A critical botanical, agronomic and historical study of this strain has been made by the writer during the past three years. These observations indicate that another explanation of the hardiness of this alfalfa is at hand. Instead of its being pure *Medicago sativa,* as has generally been supposed, it appears to possess a small proportion of *Medicago falcata* in its ancestry. *M. falcata* is the hardy drought-resistant yellow falcate podded alfalfa found wild in Eurasia. Its hardiness and drought resistance are shown by its natural growth on the dry cold steppes of Siberia, far north of the range of *M. sativa. M. falcata* differs from *M. sativa* in its tendency to a decumbent growth, yellow flowers instead of violet, falcate instead of three-coiled pods, tendency to produce supernumerary leaflets, greater resistance of the leaves to frosts, and smaller seeds. The hybrids between *M. sativa* and *M. falcata* show a mass of varying but usually intermediate forms. The flower color shows great variation in the different hybrids and many of the individual plants show a progressive color change, passing from violet in the bud or young flower through blue, green, greenish-yellow, and some may reach an almost pure yellow before the flower withers. This is a somewhat unique form of inheritance in that the flowers first show the influence of the *M. sativa* parentage and later the influence of the *M. falcata* ancestor. In all the characters, as well as in the size of the different floral parts, the Grimm alfalfa shows slight but definite departures from the corresponding characters of *M. sativa* toward those of *M. falcata.* Of the agronomic characters, the hardiness and recently noted drought resistance are most noteworthy. The slightly greater tendency of the plants of the Grimm alfalfa to lodge does not materially affect the usefulness of the strain. The presence of variegated flowers showing colors changing progressively from violet to blue, green and sometimes approaching and even reaching yellow, is perhaps the most noticeable characteristic. While about two thirds of the plants produce flowers of the violet of ordinary alfalfa; in about one third other colors are shown in the flowers, many of which show the progressive color changes as indicated above.

Similar studies have also been made of several other strains which have proved themselves to be both very hardy and drought resistant. So far as observed these have shown the variegated flowers and other correlated characters as noted for the Grimm alfalfa. The most noteworthy example of this is the commercial sand lucerne. This has proved on trial to be much nearer ordinary alfalfa than the botanical and agronomic literature on the subject would indicate. The original sand lucerne was apparently strictly intermediate between *M. sativa* and *M. falcata.* These forms are decidedly unstable and readily cross with ordinary alfalfa, whether it be grown in adjacent fields or from the seed having been consciously or unconsciously mixed. It has been found impossible to secure the original form of sand lucerne on the market and the commercial form is all that appears to be obtainable. Experiments by the writer indicate that the pollen of ordinary alfalfa is prepotent over the pollen of the hybrid plants' own pollen. The successive intercrossing with ordinary alfalfa offers an explanation for the close approach to ordinary alfalfa, while still retaining many traces of the *M. falcata* parents, especially the hardiness and drought resistance.

In advancing the influence of the *M. falcata* as the primary explanation of the hardiness of the Grimm alfalfa it was found that the consensus of opinion among the old neighbors of Mr. Grimm is that Grimm alfalfa has not materially increased in hardiness since it was introduced into this country. In the issue of the *Farm Stock and Home,* Vol. 20, page 65, the following statement is made:

> It [Grimm alfalfa] was grown successfully from the start, but for many years not much attention was paid to it and no great quantity was grown.

In a circular entitled "Grimm's Everlasting Alfalfa," published by Mr. A. B. Lyman, of Excelsior, Minn., who first called attention to the hardiness of this alfalfa, the author states as follows:

Some one has attributed the extreme hardiness of this alfalfa to acclimatization, assuming that it was a tender variety originally. We have made a careful investigation and can not find one thing to show but what this alfalfa was originally perfectly hardy. There is no doubt that there would be some change in over fifty years of growth in Minnesota. We have lately talked with Albert Gerdsen, now over eighty years old and a neighbor of Mr. Grimm, and he says that Grimm's log stable was always well filled with this hay after he had a start.

The statement made by a member of the Minnesota Agricultural Society in the proceedings of that society for 1903, that some of the early attempts to produce this alfalfa met with discouraging results, is explained by a son-in-law of Mr. Grimm to mean that the discouraging results experienced by some were due to improper seeding and location of the alfalfa fields. Those who gave proper attention to details were said not to have met with the discouraging results. It is possible that the member of the Agricultural Society was referring to some other alfalfa, since he states that the alfalfa to which he refers was brought in by Swiss immigrants; whereas, the Grimm family had been residents of Baden, Germany.

The "Alt Deutsche Fränkische" lucerne, as determined by both Mr. Brand and the writer, belongs to this same group of variegated alfalfas as do the commercial sand lucerne and Grimm alfalfa. This is said to be much more enduring under unfavorable situations than is the ordinary alfalfa. It is the sort commonly cultivated in the section from which Mr. Grimm originally came and it is quite possible that this constitutes the original stock from which he secured his seed.

The apparent correlation between the variegated flowers and associated characteristics of hardiness and drought resistance, makes it of great moment to determine if it is not possible that these dilute hybrids are possessed of such qualities as hardiness and drought resistance without the tedious selective elimination called for in the acclimatization of a hardy strain from ordinary alfalfa. It is in all probability true that any non-hardy individuals present in the original seed have succumbed, but the fact remains that there was apparently present a considerable percentage of hardy plants in the Grimm alfalfa at the time of its introduction into this country. The presence of several rather definite different forms, both in the Grimm alfalfa and in the commercial sand lucerne and in about the same proportions in each, would indicate that there has been little wholesale elimination of the Grimm alfalfa individuals. It may further be stated that the Grimm alfalfa is not perfectly hardy even at the present time in Minnesota, since the state experiment station has been compelled within the past ten years on at least two occasions to plow up fields, owing to winter-killing the first or second winter. It is, however, much hardier than ordinary alfalfa, and the studies above referred to indicate that the primary explanation of the hardiness of this strain is in all probability the presence of the apparent small percentage of *M. falcata* in its ancestry, rather than by reason of acclimatization, since its introduction into this country.

J. M. WESTGATE
BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

A CASE OF DIPLACUSIS DEPENDING UPON THE TYMPANIC MECHANISM

UNDER the title: "The Rôle of the Tympanic Mechanism in Audition,"[1] W. V. D. Bingham reports a rather unusual case, in which the sensibility for hearing remained almost normal after the removal of the tympanic membrane and the first two auditory ossicles from both ears. In that connection a description of the following case of "diplakusis binauralis disharmonika," may be of interest. This is not reported with the assumption that the case is in all respects unique, though I do not find in the literature of the subject anything wholly similar to the present one. The case under discussion is also of special value on account of the fact that the patient is a musician of exceptional talent and training, having been for a number of years president

[1] *Psychol. Rev.*, XIV., 229-243, "The Rôle of the Tympanic Mechanism in Audition."