far, before the thrust, *B*, would take up all the stress.

There is no obvious reason to limit the development of the schuppenstruktur, *A* and *B*, to two thrusts. A third and possibly a fourth might be produced. It might, however, occur that the accumulated thickness of piled-up strata should become so great, or the conditions of slight resistance in the plane of shear so favorable to displacement, that the whole recumbent mass would move forward upon a great major thrust, *C*, to an indefinite distance.

It is apparent on inspection of the diagrams that the length of the strata involved in the recumbent folds between *M* and *N* bears a relation to the total displacement on the overthrusts. The two are not equal, for the strata in the overturned limbs of the recumbent folds are stretched; but the two lengths may be said to be of the same order of magnitude.

The preceding hypothetical relations of recumbent folds to overthrusts were developed from a study of the extraordinary recumbent folds of Mont Joly as described by Ritter.[2] It followed from measurement of Ritter's sections that the length of strata involved in the recumbent folds was about 130 kilometers, whereas that included in the supposed roots was but 16 kilometers. If the folds and roots bear the relations attributed to them the lengths of the strata when developed should be at least of the same order of magnitude. The further analysis of the problem led to the conclusion that the recumbent folds represent a sequence of thrusts, as described above. The probable total displacement on thrust planes might be as much as 80 kilometers. The present position of the thrust planes would be above the Alps, or in the alpine summits, on the assumption that they have been raised during later elevation of the range. Their extent would carry them over the range to the southern slope.

At first sight this conclusion appears to accord closely with the phenomenal nappes des recouvrement of Lugeon, but there is a distinction. Whereas the nappes are supposed to have been projected over the Alps at their present elevation, the thrusts are believed to have developed in a shear zone beneath the surface, before the Alps were the visible mountains of to-day, and to have risen from a considerable depth toward the surface, as is the habit of thrusts. On independent evidence the date of thrusting is assigned to a pre-Eocene (pre-Flysch) date. The elevation which has raised the fully developed, one might say exhausted and dissected, thrust planes to the height of the summits of the Alps is, on the other hand, assigned to the middle Tertiary epoch of diastrophism, which also caused folding and the more obvious overthrusting.

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[2] 'La bordure sud-ouest du Mont Blanc,' Bull. des Serv. de la carte de la France, No. 60, profile I., Plate I.

QUOTATIONS

TEACHERS' SALARIES AND MINNESOTA

THERE has been recently among the alumni in various eastern colleges and universities, notably of Harvard and Princeton, a movement to secure funds to advance the salaries of instructors. The movement has appealed with some success to the loyalty of alumni and the benevolence of interested friends. A similar movement was actively started among the alumni of the University of Minnesota last fall, with the result that the regents of the university now have at their disposal an annual appropriation of $165,000, made by the legislature of the state, available for current expenses. Salaries of instructors have already been materially advanced in some cases to a level which places the University of Minnesota in active competition with the leading universities of the country so far as the compensation of its instructors is concerned. This must be regarded as a very important advance in the development of state universities. Its economic importance as bearing upon the general problem of the compensation of teachers is even greater, for the alumni of Minnesota appealed not only to loyalty and benevolence, but to a legislature responsible for the proper support of the first educational institution in its state. They carried through

their appeal with energy and success, in the face of strong opposition and without the heartiest cooperation on the part of the board of regents. The campaign was conducted by a committee of alumni, ably seconded by the *Minnesota Alumni Weekly*. The sum originally desired was $200,000, but the regents voted to ask for only $150,000. Yet the amount granted was $165,000. The issues of the *Minnesota Alumni Weekly* ever since the movement began have contained a quantity of valuable material bearing on the general subject. Statistics were gathered the country over, and the relation of teachers' salaries to incomes from other professions and to the cost of living was set forth. In addition, the *Weekly* published letters from various sources expressing hearty interest in the campaign. From all parts of the state committees of alumni and individuals addressed the members of the legislature on behalf of the movement. As a result, when the legislature came to make up its appropriations for the university fund, it was confronted not with the question whether salaries should be raised, but with the question to what extent they should be raised. We believe that educators generally have grounds for congratulations on this successful movement. Here is a case where the needs of higher education have been put definitely before the people of one of our most important states, and they have responded in a way which indicates a high appreciation of their economic responsibility. Their action is a challenge to emulation.—*Columbia University Quarterly.*

THE AWARD OF THE BOYDEN PREMIUM BY THE FRANKLIN INSTITUTE

In 1859, Uriah A. Boyden, Esq., in his day an eminent mechanical engineer, of Boston, Mass., deposited with the Franklin Institute the sum of one thousand dollars, to be awarded as a prize to any resident of North America, who should determine by experiment whether all rays of light and other physical rays are or are not transmitted with the same velocity.

The Franklin Institute has religiously advertised the proposition of Mr. Boyden since that time until the present, inviting investigators to compete for the premium. During this period, which covers almost fifty years, a large number of essays, possibly as many as 25 or 30, have been presented by investigators for this award, but after careful investigation by a competent committee, appointed in each case, none was found sufficiently meritorious to warrant the institute in granting the prize, until the recent investigation by Dr. Paul R. Heyl, assistant in the department of chemistry of the Central High School of Philadelphia, which, in accordance with the prescribed conditions, was submitted anonymously. This communication was referred to a special committee, consisting of Messrs. Hugo Bilgram, mechanical engineer; Professor Arthur W. Goodspeed, of the department of physics of the University of Pennsylvania, and Dr. George Flowers Stradling, of the department of physics of the Northeast Manual Training School of Philadelphia, who reported unanimously in favor of awarding the Boyden prize for an essay submitted under the pseudonym 'Algol.' The name of the author was only disclosed after the investigators had upon careful examination proved its merits. An abstract of the committee's report follows, which will indicate the extremely delicate nature of the tests required in the investigation.

The applicant 'Algol' for the Boyden premium has succeeded in demonstrating, by experiment, that those of the ultra-violet rays of light, for which glass is transparent, have the same velocity as the light rays proper.

He reasons that if the velocity of these rays were different, they would not arrive, from a distant source, at the same time. For his test he selected 'algol,' a well-known variable star in the constellation Perseus, as the source of light. By means of a diffraction grating he eliminated all but the ultra-violet rays of a known frequency, and by focussing them on a sensitive plate, obtained photographs of the star.

For the purpose of identifying the rays so recorded with the visible rays, regarding the time of their emission, he selected, for the time of his test, the time during which the