ANNUAL GYMNASTIC DISPLAY.

Swiss Gymnastic Society.

The Annual Gymnastic Display of the above Society took place on Sunday, November 26th, at the Swiss Club (Schweizerbund), and proved to be a huge success. An audience of about 250 assembled in the homely Hall of the Club to watch the clever display. The Swiss Minister was represented by M. W. A. de Bourg, 1st Secretary of Legation.

The first item on the programme was team work at the parallel bars, which was well done, although the various movements might have been a little more synchronised. The individual work at the parallel bars, was a very fine item indeed, and proved that the team has some excellent material at their disposal. The exercises were both difficult and well combined, and execution on the whole was on a high standard.

The free exercises as a team item went very well indeed, the working together of the nine men was as good as could be expected, and the contrast between relaxation and contraction was cleanly shown, in brief a very good item. It was followed by vaults on the vaulting horse; considering that the spectators encroached on both sides, and the gymnasts could only take two steps run (Anlauf), the palm of the evening must be given to this number, which showed the performers in very fine fettle. Squat, straddle, rear and flank vaults coupled with neck rolls, somersaults, somersaults from handstand, straddles and squats from handstand, scissors backwards, etc., proved not only the pluck but also the very fine training of the team and the generous applause was well deserved.

The pyramids which were of a very difficult nature, were a complete success without any untoward incident. They showed the team as a very fine set of handstand specialists on the floor, table, parallel bars as well as on their colleagues' bodies.

The leader, Mr. H. Knoll, is to be congratulated on his first display, and the untiring worker for this enterprising Society, Mr. Block also comes in for a fair share of compliments.

The display was a great success, and the splendid and well merited support, given to the Gymnastic Society, must have been a source of satisfaction to them, it also proved that this institution is in a very flourishing condition.

We are informed that only two old faces remained from last year, but the youngsters and the team was probably the youngest that ever did duty, they showed great promise and there is every reason to believe that they will develop into a magnificent team. Deprived as they were of the services of their best man, they worked splendidly and those who did not attend the show, did miss a real treat, it was a most enjoyable evening.

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To all former Members and Friends of the late Gymnastic Society "Schweizerbund" and the former Athletic and Gymnastic Society "Helvetia." May it be known that:

An Old Friends Evening and Reunion will take place on Saturday, December 16th, at 8.30 p.m., at 74, Charlotte Street, W.1, with Wurstessen and Metzgete, followed by Social and Dance. Kindly send early notice of intention to attend to the organising Secretary, Mr. H. Humbel, 74, Charlotte Street, W.1. All old Friends welcome.

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Veterans Section. A commencement will be made on the first Friday in January, — 5th of January, 1934 — *at* 8.30 *p.m.*, at 74, Charlotte Street, W.1. All Gentlemen who have already enroled, will receive special invitation in due course. Any readers of the S.O. desirous of joining, kindly note the date or send P.C. to the Hon. Secretary.

Juniors Section. A fresh start will be made on the first Wednesday in January — 3rd January, 1934 — *at* 7 *p.m.*, at 74, Charlotte Street, W.1. Ages 11 to 16 years; Swiss Parentage (either father or mother or both) essential, so as not to clash with our English sister societies, who have a hard struggle themselves.

XYZ.

THE SURVEY OF GLACIERS.

By A. E. H. Tutton, D.Sc., F.R.S.

Although the movements of glaciers have been studied for more than a hundred years, it is only recently that observations have been adequately organized on an international scale. Dr. Tutton describes the methods employed by surveyors, and shows how much their work has done to prevent the disasters which formerly involved great loss of life.

The slow but sure changes which occur in the dimensions and volumes of glaciers have for more than a century formed the subject of close study. Research has been specially directed towards the termination of glaciers in their valleys of descent — the signs of their "advance" or "retreat" — and the relative movements of their parts. At first the work was carried out by men of science, often in their private capacity at their own charges, with the primitive means of obversation then alone available, but of later years the study has been systematized by the combined efforts of official government departments and of the organized scientific forces of Glacier Commissions, both national and international. This mass attack has been highly effective in revealing much more of the wonderful nature of these grand and immense natural rivers of ice, some even in Europe extending to nearly a score of miles in length. Moreover, these regular surveys have been the means of reducing to very small dimensions, and even of absolutely preventing, the disasters which formerly brought to ruin so many lovely Alpine valleys and destroyed so many lives.

New Principles.

The character of any particular glacier is largely determined by its bed, the slope of the mountain on the side of which it is formed by the ever downward pressure of the upper snowfields and *nevé*, and by the nature of the valley down which it eventually finds its way. That is, it must be observed whether it is more or less crevassed or even torn into séracs, and in extreme cases precipitated as an icefall like that of the Rhone glacier. But there are many other factors contributing to its general appearance at any given moment. Such are, pre-eminently, the amount of snowfall which it receives, its *enneigement*, and its net loss in melting caused by solar heat, after accounting for the amount of refreezing during the night, and on cold wintry or stormy days. Hence, data as to the amount of snow accumulated and dissipated, and the net residue remaining as snow, *nevé*, or solid ice — the *nivometry* of the glacier — are all of essential value and necessarily included in a complete survey. Further, not only are obvious surface conditions, size and volume, amount and velocity of movement of the glacier, invariable items of observation, but serious and occasionally successful attempts to determine the depth (thickness) of of the glacier at a given point have in these later days been made on certain of the more important glaciers, by the more refined instrumental methods now available, involving in some cases only recently discovered principles.

Many Observations.

The ordinary theodolitic, geodesic, and triangulatory methods of survey have, of course, been used, as well as the measuring of the positions of fixed marks, deeply driven-in stakes and other erections on the glacier relatively to fixed points on the rocks at the sides. These methods have been brought up to date with the more perfect surveying instruments of today. In addition the work has consisted in the following observations: Recording regular readings of immense nivometers, scales in metres and half-metres engraved on suitable rocks standing vertically up from the glacier; recording the "state of the snow" of the *nevé* from density determinations; estimating the total and residual *enneigement* of the net bulk of the ice; taking soundings of the depth of the ice, between the surface of the glacier and its bed, by various methods adapted from those invented during the war (hydrophones) for depth-sounding at sea (and best of all by the method of the earthquake seismometer — determining the length fo path of a seismic wave between the surface and bed); and finally, perhaps most interesting of all, determining the minute daily movements of the extremity ("snout") of the glacier by means of an ingenious little instrument, the cryocinemeter, invented by Professor Paul Louis Mercanton, the Chairman of the Commission Suisse des Glaciers and Professor of Geophysics at Lausanne University. The writer spent a most interesting day last summer with Professor Mercanton, who has been for many years collecting the information for and compiling the reports of the Commission. Besides these essential observations, many others of a particular nature, on specific glaciers chosen for more detailed study, have been carried out, throwing an infinitely clearer light on the very remarkable phenomena of glaciology.

During the twenty years preceding the war, 1894-1914, the Commission Internationale des Glaciers supervised the work of glacier survey in Europe, and also published an annual report, the last, for 1913, appearing in 1914. After thirteen years of inactivity, the old lines of work being impossible, this Commission in 1927 dissolved itself, and became replaced by a new Commission des Glaciers, under the auspices of the Section d'Hydrologie of the Union Géophysique et Géodésique. Its first report was published in 1930, and summarized the variations in the lengths of the Alpine (Swiss, French and Italian) and Scandinavian glaciers, as far as the data accumulated in those years (1913-1928) was available. The Swiss observations have been made by the Cantonal Forestry officials, the French (Savoy and Dauphiny) observations by the officers of the Department des Eaux et Forêts of the Ministère de l'Agriculture and the Italian observations by departmental officers of the various districts. In the comprehensive report (1914-1928) data are given for each year for 26 Savoy and Dauphiny glaciers, 101 Swiss glaciers, and 77 Italian ones, besides a considerable number of Austrian, Norwegian, and Swedish glaciers. The change of length is given to a half-metre, a positive value indicating advance and a negative sign indicating retreat.

It need scarcely be pointed out that the terms "advance" and "retreat" refer to the increase or decrease in total length, as afforded by the position fo the "snout" termination. For, of course, the ice is always bearing downwards, the position of the snout-end being determined by the net balance of fresh precipitation and loss, dissipation, by melting. When the former is the greater the glacier is advancing, encroaching on the terrain in front of its snout; when the latter is in excess, the glacier is in retreat.

It will be of interest to be reminded that on August 11th, 1840, Professor Louis Agassiz and some companions from Neuchâtel initiated the first really scientific attempt at the measurement of glacier movement. They constructed a durable bivouac-shelter out of a large clock of micaceous schist, which arose on the ridge of the great medial moraine of the Unteraar glacier, and arranged for its regular revisitation and determination of its position. In 1842, however, they quitted this precarious refuge, facetiously called the Hotel des Neuchâtelois, for a hut on the left bank, the well-known Pavillon Dollfus. In 1844 the block had already split in two, in consequence of violent storms and continual changes of level of the glacier in its slow but sure movement downwards. Long lost to view, it was re-found in at least three pieces by a tourist, and its position measured in 1884 by Professor F. A. Forel. In 1899 it was reviewed by him, and again by Messrs. Bonard and Riklin in 1904.

Lastly, it was discovered in eight pieces in 1922 by Professor Mercanton and a party of his students from Lausanne, and a life-history of its movements was constructed by them, the travel since 1842 being well established with the aid of the most recent form of theodolite. For, happily, in 1842 Wild had determined the position of the original block with great care; the number two was still clearly visible on it when Professor Mercanton found it, and on other of the eight