developing powers of leadership rather than training technical experts. The advantages of this general military training apply equally to those taking medical and dental courses, since the military background essential to an R.A.M.C. officer can be adequately acquired in this way. Those who obtain War Certificates A and B will have definite advantages when they are called up for military service.

DISCUSSION

THE ACTIVE REGION ON THE SUN'S SURFACE

IN the *Publications of the Astronomical Society of the Pacific* Volume 47, August, 1935, it was shown that for two periods of 80 solar rotations each there was a permanent region of high solar activity as shown by Wolfer's sun-spot relative numbers.

The first series of 80 solar rotations began on January 6, 1917, and ended on December 25, 1922, and the second series began on May 16, 1925, and ended on May 4, 1931. Both series gave the maximum sun-spot activity on the same day of the average rotation period of 27.25 days. The periods were separated by 872 days (32 rotation periods) in order to include the sun-spot maxima of 1917 and of 1927–28.

The Character Figures of Solar Phenomena, as given in volumes I and II of *Publications of the International Astronomical Union,* were tested in the same manner as were the sun-spots for both 80-rotation periods, and while the results were not as definite as in the case of the sun-spots, owing to the number of missing days, they were sufficiently definite to show without question that the region of maximum sun-spot activity applied to the calcium flocculi and to both the bright and dark hydrogen flocculi which accompanied the sun-spots.

Since *The Monthly Weather Review* has been publishing daily records of the area of visible sun-spots expressed in millionths of the sun's visible surface, and since we have been passing through another period of maximum sun-spot activity, it has seemed worth while to determine if the region of maximum solar activity still persists and if it may be identified by means of the areas covered by sun-spots as it was by Wolfer's sun-spot numbers.

To test this question the total areas of visible sun-spots for each day of twenty solar rotations of 27.25 days each, beginning on July 1, 1938, and ending on January 6, 1940, were arranged in successive periods and the average total sun-spot area for each day of a single solar rotation was determined. The result is indicated by Fig. 1, where the ordinates represent 1/20 of the average spot areas for each day of one solar rotation period and the abscissas represent the days of the rotation.

The maximum sun-spot area occurred on the 14th day of the average rotation period. The date of the

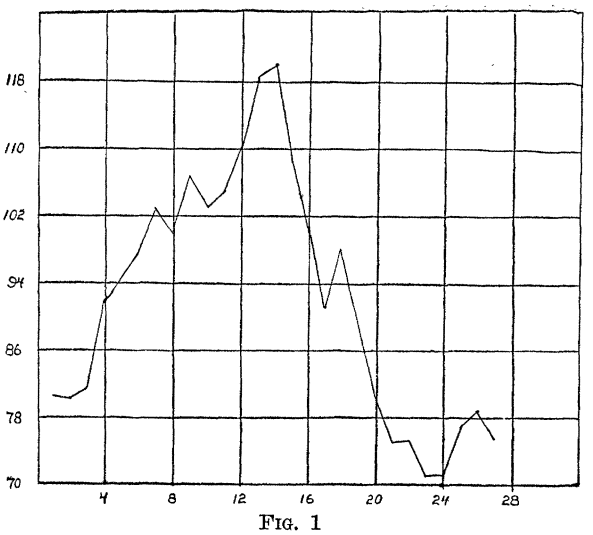

FIG. 1

last maximum of the two sun-spot series referred to above occurred on May 2, 1931. From May 2, 1931, to July 14, 1940, there were 3,287 days, equaling 121 solar rotations of 27.25 days each, thus establishing the fact that the active region on the sun's disc has persisted for 23 years since January 6, 1917.

This period is certainly too long for the persistence of a single sun-spot, and during this time there have been several years without any conspicuous sun-spot.

There are also indications that it has persisted for a much longer period. For example, the great sun-spot reported by Howlett in *Monthly Notices of the Astronomical Society of London,* 1865–66; crossed the central meridian of the sun on October 13, 1865. It had an area of more than 972 million square miles. The greatest sun-spot mentioned by Maunder, which he says was the greatest for twenty years and perhaps the greatest ever recorded at Greenwich, crossed the central meridian of the sun on October 31, 1903.

Between the passage of these two great spots there were 38 years and 18 days, 13,897 days. Allowing 27.25 days to one solar rotation would give exactly 510 solar rotations between the passage of these two great spots.

From the great Howlett spot of October 13, 1865, to July 14, 1940, was 27,109 days. Assuming that there were 995 solar rotations in this period, a single rotation would require 27.245 days, lacking only 7 minutes of 27.25 days, which period has been selected as the

solar rotation period of the northern sun-spot belt on the sun.

Evidently the active region on the sun's surface has persisted for more than seventy-five years.

It has been suspected for many years that there was a persistent region of high solar activity, but the apparent impossibility of the existence of such a region on a globe of incandescent gas and the difficulty of determining the rotation period of the hypothetical spot before daily sun-spot records were available rendered the acceptance of such a phenomenon very doubtful.

Professor C. A. Young, who in his book, "The Sun," page 148, has discussed the possibility that sun-spots appear repeatedly at the same point on the sun, concludes that "owing to the uncertainty of our knowledge of the true period of the sun's rotation the evidence is not sufficient to establish it. If it should be shown to be true hereafter, it would compel an entire revolution of the received view of the constitution of the sun."

FERNANDO SANFORD

PALO ALTO, CALIF.

THE ANNELID WORM, POLYDORA, AS AN OYSTER PEST

WITH the aid of a grant from the American Association for the Advancement of Science through the South Carolina Academy of Science, a study is being made of one of the numerous pests to which the commercial oyster, *Ostrea virginica,* of the Atlantic Seaboard, is subject and whose activities result in considerable financial loss to oystermen.

This particular pest is a small annelid which causes a "mud blister" in the oyster. This is a small, irregular, often pear-shaped, blister of mud, formed on the surface of the inside of the valve. The oyster covers this daub of mud with a layer of nacre. Within the blister one finds the annelid, which has access to the outside through two tunnels opening along the edge of the shell. This worm has been identified by Dr. Olga Hartman as *Polydora ciliata* (Johnston). Although *Polydora* is well known, its occurrence in such abundance as to become an oyster pest seems as yet unreported in the United States.

The worm upsets the normal life of the oyster by restricting its living space and generally weakening it. Infested oysters, although not unfit for food, are not readily salable because of their unsightly appearance.

I have had these worms and the blister they cause under observation since 1935. Indications are that the worms were prevalent in South Carolina even in precolonial days. An examination of numerous samples of South Carolina oysters shows that approximately 30 per cent. of the oysters in the state are infested with *Polydora.* The important point of the present investigation is to discover the possible underlying causes of its prevalence and its possible increasing abundance, and to determine means for its control.

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ALFRED B. NOBEL AWARDS IN SCIENCE

THE Alfred B. Nobel Prizes in five activities have been awarded since 1901. The 1939 winners were recently announced. Comparative ratings of the different countries whose citizens have received these distinctions have been made at various times, but such comparisons usually have not taken into account the relative populations of the various countries. Such comparisons are manifestly unfair since they give too low a placement to those countries of small population and too high to those of large populations.

In order to present a fairer estimate of the different countries' attainments in the sciences—chemistry, medicine and physics—they are here figured on a population basis, and where the prize was awarded to more than one person, each has been counted as a unit rather than as a fraction. Since the awarding committee could make no distinction between the winners, it seems unfair to the laureates and to their respective countries to count them otherwise than as separate winners. Counted in this manner there have been 128 laureates in the sciences listed under 16 different countries. The only Hungarian winner (in medicine and physiology in 1937) has been included with Austria since they were in that country previous to the Versailles Treaty. India and Russia have not been placed in the tables since the former has had but one prize winner and the latter only two. India would be rated last in Tables I and III; Russia next to last in Table I and last in Table II (she has had no prize winner since 1908). Dr. Charles D. Snyder in an article entitled "The Real Winners in the 1936 Olympic Games"[1] set forth the results in the Olympic Games in this manner.

The ideal quota is obtained by finding the sums of

TABLE I

CLASSIFICATION OF NOBEL WINNERS IN THE SCIENCES (1901–39) FOR COUNTRIES BASED ON POPULATION

Country	Number of winners	Ideal quota	Per cent. attainment	Comparative rank	Date of last award
Switzerland	5	1.2	417	1	1939
Denmark	4	1	400	2	1926
Holland	9	2.6	346	3	1938
Sweden	6	2	300	4	1929
Germany	37	20	185	5	1939
Great Britain ..	21	12	175	6	1937
Austria	6	5	120	7	1937
France	15	13	115	8	1935
Canada	2	3	67	9	1923
Belgium	1	2.6	40	10	1919
United States ..	15	40	38	11	1939
Italy	3	13	23	12	1938
Spain	1	8	13	13	1906

[1] *Scientific Monthly,* 372, Oct., 1936.