matin rearrangements, and possibly also (as in Drosophila) the order of their occurrence, as an aid in the study of racial relationships.

If mammals, like plants, retain for long periods their extra nucleoli arising through polyploidy or any other form of duplication of the nucleolus-producing chromosomes, then the nucleoli should prove a valuable aid in tracing phylogenies in this group of animals. It is now well known that in insects polyploidy in the fat bodies and other organs is a general feature of the ontogeny. From the work of Jacobi, Wermel and others, in which the nuclei of the liver and other organs fall into a geometric series of volumes, it is evident that something of a similar kind, perhaps polyteny, may take place in human ontogeny. Polyploidy in animals may thus prove to be much more wide-spread than we have been accustomed to suppose.

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LONGEVITY OF FOWL SPERMATOZOA IN FROZEN CONDITION[1]

PRESERVATION of life in monocellular organisms by storage at low temperatures offers many possibilities in biological studies requiring long-time storage. As cited by Luyet,[2] Brehme reported that cholera vibriones survived continuous freezing for 57 days at $-1°$ C to $-16°$ C and Prucha and Brannan, also cited by Luyet, isolated *Bacillus typhorus* from ice cream kept for 20 months at $-20°$ C. Jahnel[3] reports that some human spermatozoa resumed motility after having been held at $-79°$ C for 40 days and Shettles[4] reports the resumption of motility of human sperm after 70 days' storage at $-79°$ C.

A technique for preserving chicken spermatozoa by storage at low temperatures has been described by Shaffner, Henderson and Card.[5] Results from experiments using slight modifications of the original technique indicate that time is not an important factor in the retention of motility within the first year, when fowl semen is held constantly at the temperature of solid CO_2. Spermatozoa have been maintained at a temperature of dry ice ($-79°$ C) for 14 months. Little if any difference could be noted in the percentage of cells that regained motility between samples thawed immediately after freezing or those thawed after 14 months storage.

Unmated hens producing infertile eggs were inseminated with semen that had been frozen at $-79°$ C and thawed an hour later. Of 48 eggs produced by these hens after insemination 12 were fertile. However, in no case did the resulting embryonic development proceed for more than 10 to 15 hours, as determined macroscopically.

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[1] Journal paper No. 20, Purdue University Agricultural Experiment Station.

[2] B. J. Luyet, Life and Death at Low Temperature, *Biodynamico*, Normandy, Missouri, 1941.

[3] F. Jahnel, *Klin. Wchnschr.*, 17: 1273, 1938.

[4] L. B. Shettles, *Am. Jour. Physiology*, 128: 408, 1940.

[5] C. S. Shaffner, E. W. Henderson and C. G. Card, *Poultry Science*, 20: 259, 1941.

THE ERADICATION OF NUT GRASS

FOUR years ago E. V. Smith and E. L. Mayton[1] reported that they were able to control nut grass by "plowing or disking at intervals of three weeks or less during two consecutive growing seasons." As the writer's[2] laboratory experiments have shown that nut grass is killed by 1 N chlorate or 2 N thiocyanate solutions, it seemed worth while to see if the chemical method would not offer a cheaper and quicker way of control of nut grass than that suggested by Smith and Mayton.

The experiments were performed during the spring and summer of 1940 on plots which contained 250–500 plants of nut grass per square meter. One liter of solution was applied per square meter. The chlorate ion was applied in the form of sodium chlorate, the thiocyanate ion in form of calcium thiocyanate. The author is very much obliged to the American Cyanamide and Chemical Corporation, New York, for the supply of the calcium salt. The results compiled in Table I show clearly that the result of the field experiments were less satisfactory than those of the laboratory experiments. One fifth to one fourth of the plants were still surviving after 20 days. Though some of them were very weak and died within 10 more days, still about one tenth of the weeds survived and were able to repopulate the field. Also a repeated application of the herbicide would not kill them.

TABLE I

Substance	Normality	No. of experiments	Percentage of plants surviving at 20th day	Percentage of plants surviving at 30th day
ClO_3^-	2	3	26	12
CNS^-	2	2	15	10
CNS^-	1.5	2	15	..
CNS^-	0.7	2	40	22

The reason for this incomplete control was the same as for the failure of simple tillage as a method of eradication of nut grass: the bulbs, which are the most resistant part of the plant, are relatively deep below the surface and can not all be reached by the weed killer if its solution is applied to the surface only. In May and July, 1940, further experiments in neighboring plots were, therefore, conducted in this

[1] *Jour. Am. Soc. Agron.*, 30: 18, 1938.

[2] *Rev. agr., ind. y com.*, Puerto Rico, 33: 180, 1941.

way: The field was first turned over to a depth of 5 to 6 inches and then treated with the solution of the herbicide. When 2 N chlorate solution was applied this way at a rate of one liter per square meter, only 16 plants (*i.e.,* 4 per cent. of the control) were seen per square meter after 20 days. In analogous experiments with one liter of 2 N thiocyanate per square meter the number of plants was reduced to 1 per cent. or less of the control within 90 days, so that the eradication was virtually complete. Two to three months after these experiments the plots have been used again for the cultivation of corn, tomatoes and cayenne pepper without any damage to the crops. In the two following years of cultivation no new infestation with nut grass has been observed in these fields.

Hence, the simultaneous application of tillage and a 2 N thiocyanate solution seems an equally effective and cheaper way of controlling nut grass than the frequent plowing, as recommended by Smith and Mayton.

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THE DUTY OF THE ENTOMOLOGIST[1]

IT has been customary in France to designate certain scientific societies, organized without reference to commercial profit, as societies of public utility. Now, in the midst of war, we have to ask, Is the work of entomologist of public utility, and if so, in what respects? To-day I received from the Royal Entomological Society of London a large package of highly technical papers, just published, with many excellent illustrations. It would, I am afraid, have proved difficult to get those papers published in the United States, or if they were, the authors would have been expected to pay for the figures. For some time, Professor Ferris of Stanford University has been bringing out a fully illustrated treatment of the scale insects or Coccidae. Although this group of insects has great economic importance, Ferris had to put up a large sum of money to get the last part published and he states that he can not continue the work on that basis. It appears probable that we shall be deprived of a work which would be of very great value, not only now, but in the years to come.

In wartime the standard of values changes. The ordinary scientific worker, such as the present writer, has been accustomed to carry on researches looking toward a more or less remote monograph, which we may never live to see. We have regarded our work much as a mother regards her child: always interesting, very dear to us, always growing, and we hope, destined to mature and do things in the course of years. But in wartime we need results to-morrow, something which can be applied without delay to the existing situation. It is not altogether easy to adjust our minds to the new conditions, but we must do it. Just now I am much interested in the appointment, by both army and navy, of numerous entomologists who will accompany the various units to different parts of the world, and will have to ascertain the presence of any insects or other arthropods which may convey disease organisms to the troops. I am sure they will save many lives and reduce the incidence of malaria in particular. When things have become more stabilized, it is proposed that the entomologists who have to stay at home shall nevertheless have an important service to give, that of supplying information and getting species identified. Already it is possible to give some advice of consequence. Thus in New Caledonia they have neither *Anopheles* nor malaria. In the New Hebrides, not far away, they have both. Under war conditions it might be possible to accidentally carry *Anopheles* to New Caledonia, and the results might be disastrous. There are various other similar cases.

Now it will be noticed that the rapid work of the war-time entomologist is only possible because of the patient labors of earlier workers, extending through many years. This work would be more efficient if more such work had been done, but since it was clearly recognized that insects were connected with disease, the amount of study given to such insects is tremendous, and is published in many splendid memoirs. So, also, the insects affecting the crops have been intensively studied, though not yet sufficiently.

One thus comes to the conclusion that although we must largely concentrate on matters which are of immediate urgency, the relatively slow march of science should not be halted. It is quite right to urge, as a war policy, that we should reduce the use of luxuries, but it does not seem right to classify scientific work under this head. The research work of entomologists, in any country, involves only a small number of workers, and the publication facilities which they need are, as compared with other types of publication, exceedingly small. There should, indeed, be a stepping-up of research, with increased rather than diminished facilities. This not only for economic reasons, but as promoting a sane outlook on life.

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[1] In 1927, my wife and I were in central Siberia, working under the auspices of the Geological Committee of the U.S.S.R. At that time there were, I believe, about 200 trained geologists exploring all parts of the vast Russian dominions, mapping the country and recording the deposits of coal, iron and various minerals. If I had suggested at that time that the work of these geologists would, fifteen years later, be of vital importance to the United States, the idea would have seemed too fantastic to be worth discussing.