from germ cells which had been exposed during the more sensitive period, *i.e.*, from one to six days previous to laying. The number of flies observed in which visible X-ray mutations might be expected to occur was therefore not large.

In the experiments reported in the other paper[2] sibs which were F_1 of X-rayed females were mated and the resulting F_2 of the X-rayed observed. Eleven fertile matings were made of the F_1 of the X-rayed females and five of the F_1 of the control. It has already been stated that a visible recessive mutation in an X-rayed X-chromosome would appear in the male F_1. A visible recessive mutation in an autosome, on the other hand, would not appear even in the F_2 unless the mating was between two F_1 individuals each carrying the mutated gene. Such a mating is altogether beyond probability under the conditions of the experiment, since it would involve the occurrence of the mutation twice in a small number of eggs and then the accidental mating of the two individuals. So far, then, as a test for the occurrence of visible mutations the experiment involving the F_2 of the X-rayed has little to commend it over an experiment involving only the F_1. Furthermore, as the F_2 were the offspring of eleven F_1 of X-rayed parents the observations in this case involve really only eleven X-rayed germ cells.

Of more importance is the fact that all three experiments, dealing as they did with crossing over, involved the counting of large numbers of flies and therefore offered little opportunity for critical scrutiny of the individual flies except as regards the mutant characters involved in the crossing over determinations.

The data of the experiments described in the second paper[2] do, however, give some information regarding the possible occurrence of lethal mutations, a matter which, not being part of the original plan of the experiments, did not come up for consideration at the time. Going over the data from this point of view the present writer finds in the counts of the offspring of the eleven fertile F_1 of the X-rayed females three cases of irregular viability ratios suggestive of lethals in the second chromosome and in the counts of the offspring of the five control F_1 one case strongly indicating a sex-linked lethal.

The experiments referred to by Dr. Svenson in his article which were carried on in collaboration with the present writer and have been discussed above can, therefore, in no way be regarded as giving evidence against the possibility of inducing mutations by X-rays.

From time to time in experiments conducted by the present writer in this laboratory and at the Marine Biological Laboratory at Woods Hole mutations have appeared among the offspring of X-rayed females, a notable case being that of "yellow" which occurred twice in one experiment among 2,692 gray males which were the F_1 of X-rayed females and not among the 1,042 F_1 of control females which were sisters of the X-rayed females. The association of the yellow body color with the other mutant characters involved in the experiment rendered contamination very unlikely, and the fact that one of the yellow flies was a white miniature and the other an eosin miniature and the fact that they occurred in different culture bottles and one only in each culture bottle makes it extremely probable that they arose independently. The yellow males were mated to gray females and yellow stocks extracted which were bred for several generations. However, as statistical evidence of the induction of a mutation, two in the F_1 of the X-rayed as against none in the F_1 of the control is not significant. In a subsequent experiment performed, however, under somewhat different conditions no yellow flies occurred.

The above discussion has been limited to gene mutations or at least to intra-chromosomal mutations. It may properly be said, however, that the induction of non-disjunction of the sex-chromosome which the present writer had shown can be produced by X-rays[4] is in effect the induction of a chromosomal mutation.

JAMES W. MAVOR
UNION COLLEGE

THE OCCURRENCE OF PODSOL SOILS IN QUEBEC PROVINCE

RUSSIAN soil scientists apply the term *podsol* to soils occurring in cool, humid climates which, due to deficiency of calcium carbonate and the formation of organic acids, have suffered leaching of aluminum and iron sesquioxides from their A horizons. Typical podsol soils have a high accumulation of semi-decomposed carbonaceous material in the surface soil, an "ashes-like" layer below this which is very low in organic matter, and are ill-drained. More or less well-defined hardpan formation is characteristic.

Work with Quebec surface soils and subsoils in this laboratory during the last fifteen months has shown a prevalence of the podsol type in certain districts. The great accumulation of semi-decomposed organic matter in the surface six to eight inches of the podsol soils studied is especially noteworthy. The soils of limestone origin studied, which contain a fair amount of calcium and magnesium, as a rule do not show nearly so high an amount of carbon in their surface soils as do the soils originating from igneous rocks. Those limestone origin soils which do have a rather high amount of organic carbon in their surface soils

[4] SCIENCE, N. S., Vol. LV, pp. 295–297; SCIENCE, N. S., Vol. LVII, pp. 503–504; *Jour. Exp. Zool*, Vol. 39, pp. 381–432.

have also a relatively high amount of organic carbon in their subsoils, *i.e.*, even down to two feet depth.

Podsol soils have been identified as such in Brome County, near the Vermont border of Quebec, in Jacques Cartier County on the Island of Montreal, and in Hull County near the confluence of the Ottawa and Gatineau Rivers. In each of these cases small areas of non-podsolized soils of limestone origin occur near the larger podsol areas.

Some of the characteristics of the Quebec podsols so far studied in this laboratory are shown in Table I:

TABLE I
CHARACTERISTICS OF QUEBEC PODSOL SOILS STUDIED

	Surface 8″ of Soil	Subsoil—Taken between 12 and 24″ deep
Carbon	High—3.42–4.72 per cent.	Low—0.79–1.72 per cent.
Nitrogen	High—0.25–0.45 per cent.	Low—0.08–0.15 per cent.
Color	Medium to light brown	Light brown to gray
Lime requirement	Very high—5721–11,378 lbs. $CaCO_3$ per acre	High, but lower than surface—3784–6557 lbs. $CaCO_3$ per acre
Hydrogen ion concentration	High—pH 4.97–5.71	High—pH 4.94–5.76
Water-retaining capacity	Very great	Much less than surface
Percolation rate	Very low	Higher than surface
Total Ca and Mg	Low — each below 0.5 per cent. of air-dried soil	Low—but slightly more than surface soil
Water soluble Ca and Mg	Low—23–33 ppm. Ca; 13–18 ppm. Mg in air-dried soil	Lower than surface—9–16 ppm. Ca; 3–5 ppm. Mg in air-dried subsoil
Concentration of NO_3^-, K^+, $PO_4^{\equiv}$, & $SO_4^=$ in water percolates	Low	Much lower than surface
Loss on ignition	High—10.52–14.58 per cent. of oven-dried soil	Low—2.67–5.55 per cent. of oven-dried subsoil
Hygroscopic moisture	High—2.66–3.24 per cent. of air-dried soil	Low—0.89–1.96 per cent. of air-dried subsoil
Apparent specific gravity of fraction of air-dried soil passing 2 mm mesh sieve	Low—0.899–0.969	1.158–1.338

Further work on this question is in progress.

R. R. MCKIBBIN

CHEMISTRY DEPARTMENT,
MACDONALD COLLEGE,
QUEBEC, CANADA

THE NATIONAL ACADEMY OF SCIENCES

AT the annual meeting of the National Academy of Sciences, held in Washington on April 22, 23 and 24, the following papers were presented:

The regeneration of minute sectors cut from the bodies of nemertean worms: W. R. COE (introduced by Lorande L. Woodruff). When an individual of *Lineus socialis*, a nemertean found abundantly on our Atlantic coast, is cut into numerous transverse sections, each of these, with the exception of pieces cut through or anterior to the brain, quickly restores the missing organs and regenerates into a miniature of the original worm. If the transverse sections are split longitudinally along any plane, regeneration likewise occurs. Furthermore, if a section is split into four quadrants or even into six sectors, each piece may produce a minute worm of normal proportions. If, however, the sectors are incompletely separated posteriorly curious types of multiple individuals are sometimes formed. These may eventually lead to the production of normal worms either by a process of regulation whereby the less active partial individual is absorbed into the body of a more dominant individual or, more frequently, two or more of the partial individuals separate from the multiple group to develop into normal, but extremely minute, replicas of the original worm. Sectors incompletely separated at the anterior end may likewise produce multiple groups, but in this case the partial individuals are joined anteriorly and only a single head is usually formed. Eventually the single head forms a new body and separates from the multiple group as a complete individual, and the process may be repeated until all the partial individuals separate or disintegrate. Because of the high specialization of their tissues and the stability of their polarity the nemerteans are particularly favorable subjects for detailed analyses of the processes which are concerned in the dedifferentiation and redifferentiation of the cellular elements participating in the regenerative phenomena.

The physiology of sympathectomized animals: WALTER B. CANNON. Bilaterally sympathectomized animals have lived in the laboratory in good health, performing normally all the routine functions, for many months. The claims that the superior cervical sympathetic ganglia or the mesenteric nerves are essential for life are thus disproved. Additional removal of one adrenal and demedullation of the other demonstrates that the chromophil tissue is not of vital importance. Unilateral sympathectomy of young kittens has not resulted, as they have grown to adult size, in any demonstrable difference in bilaterally symmetrical organs. Sympathectomy does not prevent the female from performing the functions of reproduction. After bilateral sympathectomy emotional excitement causes no erection of hairs, no consistent increase of blood sugar, no polycythemia, no relative increase in mononuclear cells and, as shown by a few