COMMENTS

by Readers

Researchers can extend their work and reduce the burden of calculation if they use punch cards and tabulating machines.

As Neil R. Bartlett suggests (*Science*, October 18, 1946), many scientific workers are unfamiliar with punch-card techniques. His plan for multiplying in order to obtain the sum of X,X^2, XY,Y^2, we have used to multiply 8 four-digit numbers and summary punch the totals all at one time. These summary cards, which carry the progressive totals for the digit used as multiplier, may then be added into the grand total, which is summary punched, and thus the product sums desired are obtained without the manual work he describes.

The card method is especially valuable whenever there are many variables in the matrix to be multiplied and where the N is large.

We have expanded the use of cards into factor-analysis calculations. The centroid method has been described (D. M. Hall, E. L. Walker, and Isabelle Crawford. *Psychometrika*, June 1945), and we are now perfecting the principal factor method procedures. (D. M. Hall, *University of Illinois.*)

Chronic vitamin B_1 deprivation in litters of dogs can affect social dominance as measured by biting without retaliation, the order in which animals go to the food pan, and the relative or absolute immunity from attack by other animals in the group. There have been a number of studies demonstrating the existence of social dominance among such vertebrates as hens, mice, canaries, cattle, and dogs; and changes in dominance have been studied in connection with hormone administration, as testosterone propionate, restriction of cage space, and with social variables, as introducing a new animal into an established social group (W. C. Allee. *Biol. Symp.*, 1942, **8**, 139–162).

It was found in connection with another study in 1941 (I. A. Berg. *J. exp. Psychol.*, 1944, **34**, 343–368) that social hierarchies existed in each of five litters of puppies. In one litter of four males and one female, the least dominant animal, a male, was so severely bitten and so regularly driven from the feeding pan that he was isolated in a separate cage and given a special diet which included milk and raw beef. The other animals had earlier been placed on an exclusive diet of water, canned dog food, and a type of dry dog chow. After three weeks the isolated animal was again placed in the cage with his littermates with the result that he reversed his previous social position and became the dominant animal of the litter after several fights with each of his littermates.

About a week after this an increasing loss of appetite, followed by symptoms of "Fright Disease," was noted in those animals which had been fed for several months on the commercial dog food ration. Following the suggestion made by J. W. Patton (*Vet. Med.*, 1939, **34**, 372–381), 600 I.U. thiamine chloride were injected subcutaneously in all five animals daily for four days. Patton had noted that commercial dog foods are usually autoclaved and that B_1, being heat labile, is destroyed as a result of the autoclaving.

It is believed that the chronic B_1 deficiency resulting from the autoclaved dog food was directly related to observed changes in social dominance in this litter; for, after the series of B_1 injections, a number of fights ensued, and the previously dominant male resumed his ascendant position in the social hierarchy. The male which had originally been lowest and, after the special diet, highest in dominance ended as third highest in the social group of littermates. The female was lowest in the new hierarchy. This final order of dominance remained for almost two months, when no further observations were made. Similar dominance shifts associated with B_1 deprivation were noted in other litters.

It is suggested that investigators of social dominance and of hormonal effects on behavior take special precautions to ensure an adequate B_1 supply in the animals' diet, since, in addition to the effects noted here on dominance, testicular hypofunction or atrophy (C. H. Best and N. B. Taylor. *Physiological basis of medical practice.* 3rd ed., 1943. p. 1297), accompanied by reduced sex hormone secretion, can result from B_1 deficiency. (Irwin August Berg, *University of Illinois.*)

C. Perrier and E. Segrè (*J. Chem. Phys.*, 1937, **5**; 1938, **6**) showed that radioactive isotopes of element 43 could be formed by neutron or deuteron bombardment of molybdenum. Several chemical properties of element 43 were established at the time, as well as some nuclear properties of the spectral isotopes. These isotopes were found in nuclear bombardments by the 37-inch cyclotron of the Radiation Laboratory, University of California.

Later, C. S. Wu and E. Segrè (*Phys. Rev.*, 1940, **57**) found element 43 among the fission products of uranium, a source from which relatively large amounts of 43 can be isolated.

It seems appropriate now to give this element the name technetium, from the Greek τεχνητός, artificial, in recognition of the fact that technetium is the first artificially made element. The corresponding chemical symbol should be Tc.

In 1940 D. R. Corson, K. R. Mackenzie, and E. Segrè (*Phys. Rev.*, 1940, **57**) prepared the isotope of mass 211 of element 85 by bombarding bismuth with alpha particles accelerated in the 60-inch cyclotron of the Radiation Laboratory, University of California. At that time they established several chemical properties of element 85 and made a rather complete nuclear study of the isotope formed.

A name should now be given to this new element and, following the system by which the lighter halogens chlorine, bromine, and iodine have been named—by modifying a Greek adjective denoting some property of the substance in question—the discoverers propose to call element 85 astatine, from the Greek ἄστατος, unstable. Astatine is, in fact, the only halogen without stable isotopes. The corresponding chemical symbol proposed is At. (E. Segrè, *University of California, Berkeley.*)