had ten offspring at once and the other of which had ten offspring one at a time: the average contribution of each individual to the next generation would be the same. It is obvious, however, that there would be a great difference between them; one is investigating its reproductive effort in one clutch and the other in ten clutches. If it were certain that a clutch would survive, regardless of its size, then clearly the variability in the number of offspring of the second individual would be much smaller than that of the first.

Until the publication of Gillespie's article, selection resulting from differential variance in offspring number had been ignored by theoreticians despite its obvious importance to the evolution of complex life histories. Gillespie shows that an allele which produces the same mean number of offspring but a smaller variance will increase in frequency and he argues that an important mechanism for reducing offspring variance is repeated reproduction and smaller clutch size. Gillespie deals only with a haploid population and, even then, the analysis is somewhat difficult. His simplification of the original model certainly needs more careful examination.

Although further mathematical work on the problem is needed, other results should support Gillespie's conclusion. Although many geneticists have assumed otherwise, the evolution of complex life histories involves more than simply the maximisation of reproductive potential.

OSSO

from our Chemical Physics Correspondent

No, the title of this piece is not an acronym for the Office for Senior Scientists' Obsolescence, that secret body which arranges for its 'clients' to be shunted into administration at 35 to make way for the next generation of research workers. It is rather the genuine chemical structure of a molecule recently characterised by Lovas, Tiemann and Johnson (*J. chem. Phys.*, **60**, 5005; 1974). It is formed, under conditions controlled as much by art as science, in the fairly high pressure, 10^4 Pa (100 mm Hg), microwave discharge in SO_2. SO is a major product and the yield of it and its dimer seems to be a function of wall conditions as well as other components in the gas mixture. Careful lifetime studies have not yet been reported, but the half life is of the order of a few seconds under the flow conditions used. Polymeric deposits formed on the walls and some OSSO appeared in the gas phase when the surface was exposed to oxygen under discharge conditions.

The identification of OSSO was by means of a microwave spectroscopic study which established (1) that the molecule was planar; (2) that it had a large dipole moment, 10.7×10^{-30} C m (3.17 debye), parallel to the intermediate axis of inertia; (3) that alternate rotational levels were absent, being forbidden by the spin statistics of a symmetrical molecule containing the bosons ^{16}O ond ^{32}S; (4) that there was a vibrational state, probably torsional, at about 140 cm^{-1}; (5) that an analogue containing ^{34}S could be detected and that in it the full set of rotational levels was allowed. These facts, together with the values of the rotational constants, clearly show the species to be *cis*-OSSO, planar with C_{2v} symmetry.

The geometrical structure is then established with $r_{SO}=145.8$ pm (1.458 Å), $r_{SS}=202.45$ pm (2.0245 Å), and the SSO angle=112.7°. This is a short S–O bond and a fairly long S–S bond so that the formula, $O^-–S^+=S^+–O^-$, which matches classical valence rules, is in fact not very realistic, and the distribution of the six π electrons over the four centres is more delocalised than the above structure might imply. The characterisation of this molecule with its comparative stability is likely to catalyse further work on its electronic structure, on its vibrational and electronic spectra, and on a search for a possible *trans* form which, having no dipole moment, would not appear in the microwave spectrum. There could also be interest in isoelectronic species such as OSPF and FPPF.

Is history of science good for one?

from Robert Olby

In a recent article in *Science* (**183,** 1164–1172; 1974) the historian of physics, Brush, has described the "new look" which the history of science has acquired in recent years. Writing under the provocative title "Should the History of Science be rated X?", Brush pictures the old history of science as motivated by the search for approaches to modern scientific knowledge in the works of the past, thus to expose to view the progressive character of the development of science and its objectivity. Now the picture has changed and what Brush sees as emerging is the subjective manner in which scientific work and ideas are accepted or rejected. The roles of simplicity, analogy, unity and purpose seem to have been more important than mere empirical verification. To the believer in Galileo as the founder of the experimental method it comes as a shock to learn that the words "by experiment" were inserted in the English translation of the famous sentence "I have discovered by experiment some properties of [motion]"; or to see how the caloric theory of heat was overthrown not by the experiments of Count Rumford and Davy but by the acceptance of the wave theory of light and the analogies between light and heat.

The subjective and social features of scientific activity have been embodied in Kuhn's division of science into "normal" and "revolutionary". In a state of "normal science" the onus for proof lies with those who wish to overturn the established body of theory and practice (the "paradigm") and not with those who uphold the paradigm. In this way the choice of problems as well as the significance accorded to experimental results tends to be determined by factors which are not purely rational and objective.

This type of approach to the history of science may be seen as subversive of the cult of scientific objectivity, so long regarded as essential to a scientist's education. Brush suggests not only that it furnishes a "more realistic picture of the behaviour of scientists", but also that it serves to soften the hard image of the "robot-like scientist lacking emotions and moral values".

Brush has, of course, expressed reservations to the "new look", he describes. He recognises that so eminent an American historian of science as Gillispie has argued for the objectivity of science. In Britain it is doubtful that an extreme relativist view of scientific knowledge has been established outside the gamut of the sociology of science. The British tend to believe that sufficient elements of such knowledge survive Kuhnian revolutions to justify the use of the words "development" and "progress". They would, at least, side with Bernard who judged progress in science by the criterion of the degree of control over the phenomena. They also recognise the distinction between what is irrational (counter to reason) and what is rational but devoid of any empirical supporting evidence. It is very doubtful that any but the most narrow-minded educators and the most gullible of students are discouraged by the historian's exposure of the rich and varied foundations upon which science has been erected.