

vibrations of the molecule. It had been hoped that a comparison between the hydrazine and the hydrazine hydrate spectra would show a difference in the intensity of the line corresponding to the N-N vibration in each molecule, but the results are so far indecisive on this point.

It is of interest to compare the three lines of hydrazine with the three lines which Daure (*Trans. Faraday Soc.*, Dec. 1929) gets in liquid ammonia, namely, 3210  $\text{cm}^{-1}$ , 3300  $\text{cm}^{-1}$ , and 3380  $\text{cm}^{-1}$ . Ammonia gas shows only one line at 3330  $\text{cm}^{-1}$ , according to Wood (*Phil. Mag.*, 7, 1929) and other workers; and it has been suggested that the triplet in the liquid is the result of association into molecules of the type  $\text{H}_3\text{N}-\text{NH}_3$ . On the surface, the hydrazine result would seem to strengthen this view, but one cannot be certain until the structure of hydrazine has been more fully worked out from its infra-red, as well as from its Raman spectrum. The work for this molecule is now being carried out here along with similar work for other simple molecules and upon the results it is hoped that a description of the exact selection rules will be obtained.

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#### The Activity of Surfaces.

IN recent years a good deal of attention has been given to the relation between the catalytic effect of a surface and its structure, and in this connexion it is perhaps of interest to point out that the general idea underlying many theories was published by me in 1911 (*J. Chem. Soc.*, 475 ff., 1911) in a qualitative form. The hypothesis in relation to the specific problem studied, the dehydration of a salt crystal, was based on the view that the lattice structure of such a system was disturbed, and that the rearrangement of the surface (described as 'amorphous', in harmony with the prevailing views before the application of the X-rays to crystal analysis had been discovered) underwent a recrystallisation, a process which required time. It was further pointed out that "a treatment of somewhat simpler systems than the present, such as occur, for example, in the 'ageing' of deposited catalytic surfaces, would probably present points of interest"; and such has, in fact, proved to be so. This view of a catalytic surface is incompatible with a smooth 'chess-board' surface. The latter has now been recognised as inadequate. The application of the idea to heterogeneous reactions has been considered by Slonim (*Z. Elektrochem.*, p. 439, 1930). The examination of all such surfaces by X-ray analysis would, clearly, throw much light on the general problem, as Slonim shows in a particular case. The method contemplated had, however, the use of reaction velocity in mind.

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#### Evolution and Ethics.

THE correspondence in NATURE of Nov. 29 under the heading "Heredity and Predestination" raises a topic of surpassing interest.

An ethical system of some kind is an essential adjunct of every social organisation. Apart from the social organisation to which it is related, any ethical system is a mere abstraction. On the other hand, a species without social organisation can have no ethical system. For such a species ethical values do not exist.

Ethical systems are in general just as much a pro-

duct of evolution as are the bodies of individual organisms. If it were possible to view our own ancestry sufficiently far back, we should be able to trace an unbroken series commencing with a creature without social organisation or the possibility of ethical standards of conduct and proceeding by gradual steps to the present stage of organisation with its related standards, which, in conformity with the well-known dictum of Heraclitus, is no more permanent than its precursors.

Viewing the world of the present day, it is obvious that a variety of differing ethical systems are in actual operation in the human as well as in other social species. It is also obvious that the number of ethical systems which are theoretically possible is unlimited. The only condition that must be satisfied is that the ethical system must be in harmony with the society to which it applies. Failing such harmony, instability would ensue, with results which need not now be pursued.

Within the sphere of any ethical system the term 'good' applied to conduct means simply that the conduct is in accordance with the dictates of the system. The same conduct under another ethical system would possess a certain value, but would not necessarily be 'good'. Considered apart from all ethical systems no conduct can be assigned any ethical value.

So far as the comparison of ethical systems is concerned, it is impossible to condemn one or to favour another on ethical grounds. This is a field in which an ethical court can have no jurisdiction, as there are no ethical principles on which it can proceed. If one were to assume the superiority of one ethical system, it would be easy to condemn all others, but such a procedure would be transparently naïve.

On the other hand, there exists a court which does exercise jurisdiction in this field. As there is no appeal against its decisions, it is perhaps deserving of rather more consideration than it receives. The authority of this court depends on the fact that ethical systems have a most potent selective influence over the individuals composing the society in which the systems function. The existence of the social organisation shields the individuals comprised within it from many of the hazards that arise from the external environment. The selective effects of the external environment are thus minimised and their place is taken by the internal selective activity of the society itself, exercised in accordance with its ethical system. The more highly developed the social organisation the more far-reaching will this activity become. Ultimately the evolutionary trend—whether upwards or downwards—of the individuals composing the society will be controlled principally through this type of social selection. One ethical system will lead to degeneration and ultimately extinction, while another will lead in the opposite direction. We have here the natural criterion for discriminating between ethical systems. We are thereby enabled to apply the term 'good' or 'bad' to any ethical system, but it should not be overlooked that in such application neither term possesses an ethical connotation.

I will conclude by quoting in translation one of the less familiar fragments of Heraclitus:

"The Ephesians would do well to hang themselves, every grown man of them, and leave the city to beardless youths; for they have cast out Hermodorus, the best man among them, saying: 'We will have none who is best among us; if there be any such, let him be so elsewhere and among others'."

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