discrimination between the two types of nucleon. This still seems to be an open question.

Although there are several ways of measuring the mass distribution in a nucleus, including nucleon or pion scattering and kaon absorption, techniques for recording the charge distribution are more scarce. One way is to study the X-rays emitted from atoms that have captured a negatively charged mu-meson into orbit. Muons, being heavier than electrons, orbit much nearer the nucleus, and on undergoing transitions emit X-rays which offer valuable information about how the charge is distributed inside the nucleus.

CHEMISTRY

Magneto-optical Effects

from a Correspondent

It was appropriate that the Faraday Society held its symposium on magneto-optical effects at the Royal Institution on December 11 and 12. It was there that Faraday discovered the connexion between light and magnetism in 1846, when he found that the axis of plane-polarized light could be rotated by passing it through a piece of glass between the pole-pieces of an electromagnet.

Although the Faraday effect has been widely studied by physicists, only since the middle of the 1960s has it attracted much attention among chemists. Magnetic optical rotatory dispersion (MORD) and the related technique of magnetic circular dichroism (MCD) provide a means of examining the angular momentum properties of both the ground and excited states of molecules with electronic transitions which remain too broad, even at low temperatures, for the Zeeman effect to be observed directly. The chemical systems studied by these methods in the past few years include small high symmetry inorganic molecules, transition-metal and rare-earth ions doped in crystals, organic compounds and biological macromolecules, all of which were discussed at the symposium.

Perhaps the most fruitful application of MCD spectroscopy has been in assigning electronic transitions in inorganic chromophores. Professor P. N. Schatz (University of Virginia) presented results on solutions and crystals containing B-subgroup ions with s^2 ground states, such as In^+ and Sn^{2+} in alkali metal halides. The magnetic moments of the lowest excited states are lower than expected for octahedral ions, and discussion centred on mechanisms by which the angular momentum might be quenched, such as distortions resulting from charge compensation vacancies, or what inorganic chemists would call the "inert pair effect". Professor Schatz also reported some high-resolution MCD data obtained at liquid helium temperatures on hexachloroosmate ions doped into Cs_2ZrCl_6 which, when fully analysed, may help to resolve the controversy about whether the absorption bands in these ions result from ligand-field or charge transfer transitions.

MCD spectra are clearly going to be a most useful adjunct to the attempts, such as those described by Dr A. J. Thomson (University of East Anglia) and Dr P. Day (University of Oxford), to extract quantitative chemical information from inorganic charge transfer spectra. Day and Dr B. Briat (Paris) have obtained MCD spectra of transition metal tetrahalide complexes. In these, as in the hexahalides studied by Schatz, the role of metal and ligand spin–orbit coupling is crucial to an understanding of the spectra. In a similar vein, an analysis of the MCD through the spin–orbit components of one of the ligand–field transitions of the tetrachlorocobaltate ion enabled Dr R. G. Denning (University of Oxford) to derive metal–ligand mixing parameters of a type which will be valuable for testing molecular orbital calculations.

For MCD experiments on crystals the light must be propagated along a unique crystal axis. To overcome this problem and enable anisotropic centres to be studied, Drs J. Badoz and B. Briat (Paris) described some measurements of the Cotton–Mouton effect (magnetically induced linear dichroism).

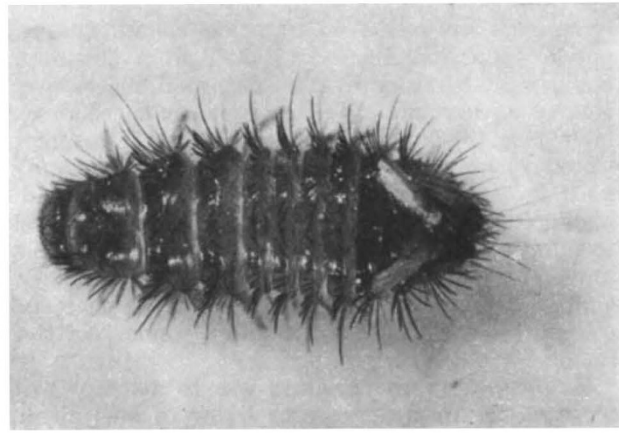
The selection rules governing the appearance of an MCD spectrum are determined, of course, by symmetry, and Professor P. J. Stephens (University of Southern California) gave an unusual example of how MCD spectra could be used to examine the shapes of molecules in solution. He concluded that in fuming sulphuric acid solution the Se_4^{2+} ion is square, as are Te_4^{2+} and the previously unknown S_4^{2+}.

Other participants dealt with various aspects of the Zeeman effect in molecular spectroscopy. Professor R. M. Hochstrasser (University of Pennsylvania) showed how the zero-field splittings of triplet states in organic molecules could be determined from high resolution Zeeman experiments in fields below 20 kG, while by monitoring the effect of microwave pumping on the phosphorescence spectrum, Professor M. Sharnoff (University of Delaware) was able to determine the electron spin resonance parameters of short-lived triplet states in benzophenone. Finally, the effect of magnetic fields on microwave pure rotation spectra led Professor W. H. Flygare (University of Illinois) to an elegant method for determining the diamagnetic anisotropies of small organic molecules.

PUBLIC HEALTH

Hereford's "Woolly Bear"

Militant council tenants in Hereford have been responsible for drawing attention this autumn to a local plague of "woolly bear". In fact, the pest is a well known suburban resident over a wide area of southern Britain, from the Severn to the Wash, but it seems recently to have strayed a little north of its normal beat. Larvae of the insect, *Anthrenus verbasci* (alias



Lava of *Anthrenus verbasci*.