ing of the bond between the central nickel atom and each of the attached phosphorus atoms is of particular interest. The corresponding value of k_{Ni-C} for nickel tetracarbonyl, likewise calculated[3] on the basis of a simple valency force field, is 2·52. Both k_{Ni-P} and k_{Ni-C} are in the range normally expected for single bonds, and are thus remarkably low in view of the other evidence which has led to the conclusion[1,4] that nickel–ligand bonds of this kind have appreciable double-bond character.

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Retinal Type of Photovoltaic Cell

IT is known that the retina of the animal is a photovoltaic mosaic composed of countless minute individual light receptors. The gradual development of multiple electrode photovoltaic cells may perhaps lead to an actual working model of the retina.

Previously constructed multiple-electrode photovoltaic cells have the seat of their photopotential within each single electrode unit. A typical example of a wet multiple photovoltaic cell is the telephotographic system of Ruben[1], which utilizes the copper/cuprous oxide barrier-layer in each individual receptor unit. Photoemissive mosaic cells such as the television iconoscope, etc., obviously do not approach the retina in principle.

The cell described here is unlike previous multiple-electrode wet photovoltaic cells in that the individual electrodes are completely inert; the seat of the photopotential is apparently in the space charge formed in the volume around the point electrode during irradiation[2]. Certain organic structures when irradiated in solution produce photopotentials with respect to the unirradiated solution, a development from the Becquerel effect. The point electrode here is a potential probe.

The construction of the multiple cell, together with the irradiation box, is shown in Fig. 1. The cell can have as many points as desired on any shape of surface, and only one common dark electrode is required. In Fig. 1, nine point electrodes are shown mounted in a piece of cylindrical 'Bakelite' coil form which is cemented to a glass slide. The bottom electrode is made the common dark electrode. Platinum wire 0·02 in. in diameter is used for all the electrodes. The exposed platinum wire ends inside

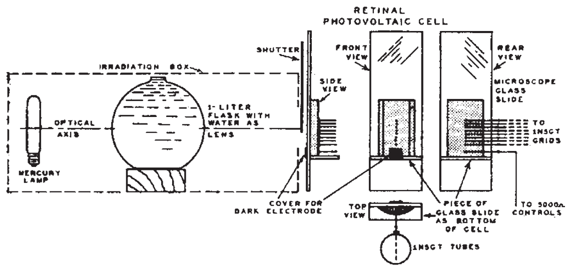

Fig. 1. Retinal photovoltaic cell and irradiation box

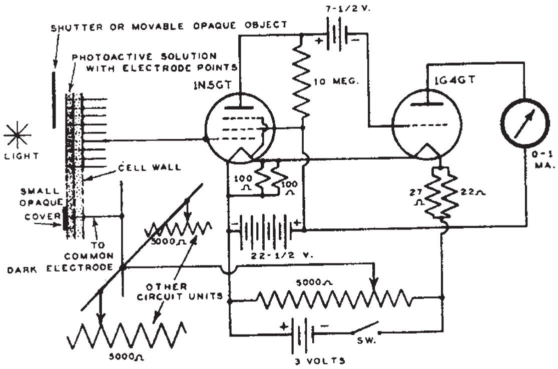

Fig. 2. Amplifier 'brain' unit attached to one electrode point

the compartment are about 0·05 in. long and can be assumed to be points. The cell is cemented together with an epoxy adhesive. A small strip of black electrical or masking tape hides the bottom point from light. The cell is filled with about 0·25 c.c. of a 1 per cent solution of benzoin in 95 per cent ethyl alcohol as one of a series of photoactive solutions[3]. A photopotential as high as 0·15 V. may be generated by each irradiated point with this solution; but in general, sensitivity of the point electrode to the space charge surrounding it during irradiation is more important than the magnitude of photopotential if an analogy to the retina is to be drawn. The wave-length response of the cell is dependent on the photo-active solute used.

The cell obviously requires an auxiliary apparatus to indicate that the cell is actually seeing light and a moving object. Fig. 2 shows a simple battery-operated electronic amplifier actually used for each irradiated electrode point. Each milliammeter indicates what its respective point is seeing—light or darkness.

The analogy between the rods and cones of the retina and the point electrodes of this photovoltaic cell, the roles of visual purple and the photo-active solution, and the requirement of a common dark electrode or 'ground' are accented with discretion.

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Contrast in the Electron Microscope Image

THE detail seen in a highly magnified electron micrograph is to-day limited more by a lack of contrast in the image than by any lack of resolution in the microscope, which is now usually capable of resolving objects at least as small as 15 A., that is, only a few atoms in diameter. Contrast may be increased either by metal-shadowing the surface of the specimen or by treatment with various reagents. By analogy with the use of stains in light microscopy this latter technique has come to be known as 'electron staining' (perhaps this is an unfortunate, if convenient, term since the analogy is not very