fluence of Professor Karl Pearson both in the matter and the manner of Dr. Pearl's productions. Although several of the articles are severely technical, they are written in an attractive style and the general reader who is interested in his own species, but who knows nothing of mathematics and little of biology will find in them material of interest. The serious student of human biology can not afford to neglect this volume.

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SPECIAL ARTICLES

UNICRYSTALLINE PALLADIUM WIRES

VARIOUS metals have within recent years been obtained in the form of "single crystal" wires, or wires in which the entire cross-section, save at exceptional points, is occupied by one crystal. The first metal to be so obtained appears to have been tungsten, and most of the subsequent studies of unicrystalline material have related to this metal. Other metals which have been prepared in unicrystalline form include molybdenum, aluminium, bismuth, lead, tin, zinc and cadmium, the work of Czochralski, of Polanyi and of Carpenter being particularly noteworthy in this connection.

Since the unicrystalline condition is the one in which a metal best lends itself to the investigation of many of its properties, experiments have been made by the writers with the purpose of producing unicrystalline wires of palladium. The palladium employed was a metal of exceptional purity, secured from the Bureau of Standards.[1] The treatment to which it was subjected consisted in causing the wire, after it had been drawn down to a diameter of approximately 0.05 mm (2 mils) and slightly annealed, to pass at a rate of 9.4 mm per hour past two mercury contacts, 25 mm distant from each other, while a current of from 550 to 600 milliamperes entered the wire through the lower, water-cooled contact, and left through the upper contact, which was not thus cooled. A considerable temperature gradient was in this way maintained in the portion of the wire included between the contacts, of which the hottest part was at a "yellow red." An asbestos enclosure served to protect the heated wire from draughts of air, in order that the variations of temperature might be as small as possible.

[1] The palladium was from that prepared in the recent investigations of the Bureau of Standards upon the platinum metals and came from a particular lot reported by the bureau in April, 1924, to be "nearly spectroscopically pure, containing a trace of calcium, but purer than any other palladium made or procured by the bureau."

Short pieces of the wires which had been thus treated were embedded in blocks of a 50 per cent. lead-tin alloy, which proved to have a convenient degree of hardness, and were then polished and simultaneously ground flat, with the finest grade of French emery paper. These specimens were etched by a three-minute immersion in a 1-normal solution of potassium bromide, saturated with bromine, or by a thirty-second treatment with aqua regia (3 HCl:1 HNO_3). Upon microscopic examination with vertical illumination, at a magnification of 200 diameters, they displayed clearly the appearances which Mark, Polanyi and Schmid[2] have described as characteristic of unicrystalline wires. Grain boundaries, while still to be found, occurred only at infrequent intervals; parallel etching lines marked the surface of the wire, and were unaltered in position by repeated etchings; and a system of ellipses, in planes which were parallel to each other but not to that of the etching lines, indicated points of incipient slip. In regions where the wire had been subjected to more than the average longitudinal stress it was seen to be constricted in one axial plane, but not in the plane normal to this, so that a ribbon had resulted. The fractured ends of treated wires which had been loaded to the breaking point exhibited a smooth plane of fracture, which formed an acute angle with the axis of the wire, instead of showing the irregular or cupped fracture of microcrystalline or untreated wire.

Rough measurements of the ductility of the wires, made by gradually increasing the tension upon lengths of from 80 to 159 mm, until rupture occurred, gave elongations which ranged from 0.7 to nearly 4.0 per cent. for three treated wires, while for two pieces of the untreated wire the elongations were too small to be measured by the method employed, being less than 0.2 per cent.

While no Roentgenographic examination has been made, it is therefore evident that palladium wires treated in the manner indicated are unicrystalline, and it is intended to study them further in respect to their occlusion of hydrogen, and to certain of their electrical and magnetic properties.

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GEOLOGICAL OBSERVATIONS ON THE ISLAND OF MAUI, HAWAII

THE island of Maui, the second largest of the Hawaiian group, is the principal section of a great vol-

[2] Mark, Polanyi and Schmid, *Zeit. Physik.*, 12 (1923), 58–72; 78–110; 111–116.