sine in the perfusate was the source of the norepinephrine with but little dilution by tyrosine in the bulk of heart. Of course, only a fraction of the heart tissue represents sympathetic nervous tissue.

The estimated rates of formation, shown in Table 1, are probably too low for two reasons. First, norepinephrine was continuously released from the heart and appreciable amounts of acidic metabolites of norepinephrine were detected in the perfusate. Second, the tyrosine concentrations in the perfusate ranged from 0.15 to 0.33 μg/ml as compared to a normal plasma level of about 10 to 15 μg/ml. It is quite possible that the rate could have increased with larger concentrations of precursor. Estimates on the rate of synthesis of norepinephrine in intact mammalian heart have ranged from 0.03 to 0.2 μg/g per hour (*7*). It is apparent therefore that the rate of synthesis by the isolated perfused guinea pig heart is at least comparable to that reported in the intact animal.

Thus, the isolated heart contains all the catalysts required for converting tyrosine to norepinephrine:

tyrosine ⟶ dopa ⟶
dopamine ⟶ norepinephrine

Furthermore, norepinephrine synthesis could take place in each sympathetically innervated organ including heart, spleen, brain and blood vessels. These results reaffirm the widely held concept that norepinephrine, in contrast to epinephrine, is a local hormone.

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Indium Antimonide: the Metallic Form at Atmospheric Pressure

Abstract. *The crystal structure of metallic indium antimonide at atmospheric pressure and −197°C is essentially identical with that of white tin at 26°C.*

Compression of group IV elements and of group III–V and group II–IV binary compounds transforms them into metals (*1–3*). The phase change is marked by a large increase in density and a rise in the number of equivalent near neighbors from four, which is characteristic of these materials at low pressure, to six, which is characteristic of the new phase (*4*). The work of Drickamer and his co-workers (*3*) and of Kennedy and his co-workers (*1*) has clearly demonstrated the generality of the phenomenon.

Jamieson has examined the crystal structure of the metallic form of indium antimonide under high pressure and found it to be analogous to that of white tin. We now report a low-pressure study that shows the structure to be essentially identical with that of ordinary metallic tin.

The metallic form of InSb may be obtained at low pressures by cooling the material while it is under pressure and then reducing the pressure. The metallic form was first made as described previously (*1–3*) by application of pressures a few kilobars in excess of the transition pressure of 23 kb at a temperature of about 95°C. Periods of several hours were used to insure complete conversion.

Liquid nitrogen was then used to cool the entire assembly of press and sample. When the temperature of the sample had dropped to well below 210°K (−63°C) the pressure was released, and the sample was removed from the cylinder, which contained tungsten carbide. We found that the material was a very good metal with a very low resistance, comparable to that of aluminum at temperatures between 77° and 210°K. It was very shiny and metallic and extremely hard, somewhat like tool steel. It was found, empirically, to be stable for weeks, so long as it was kept at temperatures below −63°C, and it was even possible to machine it.

An x-ray diagram was taken by the Debye-Scherrer technique at 77°K. The spectrum with CuK α radiation is given in Table 1, together with the lattice spacings of ordinary white tin (*5*).

Table 1. Lattice spacings of white (or β tin) and metallic indium antimonide, InSb(II). The unit-cell dimensions for Sn(β) at 26°C and InSb (II) at −197°C are, respectively, *a*, 5.831 and 5.72 ± 0.16Å; *c*, 3.182 and 3.18 ± 0.03Å. The corresponding densities are, respectively, 7.286 and 7.54 ± 0.16 g/cm³.

hkl	Sn(β), d(Å), Cu. 1.5405 Å	InSb(II), d(Å), Cu. 1.5405 Å
200	2.915	2.90
101	2.793	2.78
220	2.062	2.05
211	2.017	2.02
301	1.659	1.65
112	1.484	1.48
400	1.458	
		1.44*
321	1.442	

* Unresolved.

It is clear from these data that the two structures are identical to within 0.02 Å in the spacings for the body-centered tetragonal lattice (*6*).

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26 February 1963

Indium Antimonide: Superconductivity of the Metallic Form

Abstract. *The transition of metallic indium antimonide into the superconducting state begins at 2.1°K and is complete at about 1.6°K. These data are close to those for white tin.*

Superconductivity in metallic InSb, prepared and stabilized at atmospheric pressure in the way described by Darnell and Libby (*1*), has been observed.

Samples about 1 inch long and about

¼ inch in diameter were placed as the core of a pair of coils wound one upon the other. Electric pulses of 5 μsec duration were fed into the primary coil. The secondary coil was connected to an oscilloscope. The procedure is similar to the method described by C. P. Bean *et al.* (*2*) for measuring the resistivity ratio in metals. With no core or an insulating one inside the coils, the trailing edge of the pulse in the secondary is sharp and steep, like the trailing edge of the primary pulse. In a metallic core, the primary pulse induces eddy currents whose decay rate determines the decay of the secondary pulse. If the metal of the core becomes superconducting, the curve resembles again that of an insulator, since practically no eddy currents are induced.

Figure 1 shows the decay curve for a sample of metallic InSb in the normal conducting state at 4.2°K, indicating a very good conductivity comparable to that of tin or indium at the same temperature. Figure 2 shows the decay curve for the same sample after it has become completely superconducting.

The superconducting transition started at about 2.1°K and was complete at about 1.6°K. The broadness of the transition is not surprising, considering that the samples are presumably heavily strained. Darnell and Libby report that the structure of metallic InSb is practically identical with that of tin (*1*). The fact that the observed superconducting transition temperature is so close to that of tin seems to be another confirmation of this fact (*3*).

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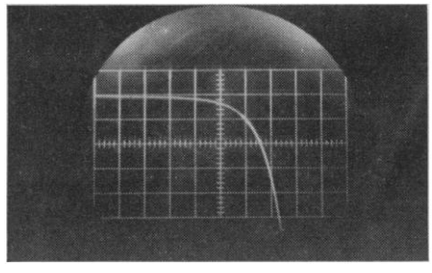

Fig. 1. Decay curve at secondary coil with sample of metallic InSb as a core at a temperature of 4.2°K. Decay is indicative of a sample of very high conductivity, comparable to that of pure tin or indium above their transition temperatures. The vertical scale shows voltage, the horizontal shows time.

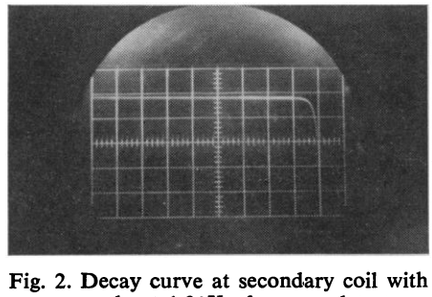

Fig. 2. Decay curve at secondary coil with same sample at 1.3°K after complete transition to the superconducting state.

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Synthesis of Chicken Antibodies of High and Low Molecular Weight

Abstract. *Two major populations of chicken macroglobulin antibodies in primary- and secondary-response serums are associated with electrophoretically slow- and fast-moving γ-globulins. If the fractions separable by electrophoresis are treated with 2-mercaptoethanol, two populations of 7S antibodies are revealed. Primary-response precipitins have the characteristics of macroglobulins.*

The synthesis of high concentrations of macroglobulin antibodies (19*S* class) in the early phases of antibody production is often followed by the synthesis of increasing amounts of antibodies of low (7*S* class) molecular weight (*1*). Generally, 19*S* antibodies are characterized as γ_1 or β-globulins of high anionic binding, which are easily dissociated by sulfhydryl reagents (*2*). The 7*S* antibodies are usually associated with the slower-moving globulins of low anionic binding and are more resistant to sulfhydryl reagents. Recently we reported that in the chicken at least three chromatographically distinct macroglobulin antibodies are produced after a single injection of bovine serum albumin (BSA) and that these antibodies remain at relatively high concentrations even after a second exposure to antigen (*3*, *4*). In contrast, the ratio of 19*S* to 7*S* antibodies in rabbits drops rapidly in a short period of time after a single injection of BSA, and the conversion from 19*S* to 7*S* responses is accompanied by changes in electrophoretic patterns (*1*). In the present study, the electrophoretic patterns of anti-BSA chicken antibody obtained after a single injection, or after repeated injections, of BSA were similar. This similarity resulted from the initial synthesis of two populations of 19*S* antibodies which were replaced by 7*S* antibodies of similar mobilities.

Primary antibody responses were induced in adult Austra hens by a single intravenous injection of 40 mg of BSA (Pentex), and secondary responses were induced by a second similar injection 3 weeks later. Booster serums were obtained by giving four intramuscular injections daily (10 mg of BSA each), 3 to 4 weeks after the secondary injection. Individual and pooled serums, inactivated by heat and adsorbed with sheep red blood cells, were fractionated by starch-block electrophoresis (*5*). The time of bleeding the hens for serum for electrophoretic analysis was selected on the basis of previous observations (*4*) that high concentrations of macroglobulin hemagglutinins (HA) were produced 6 days after immunization. Fractions eluted after electrophoresis were assayed for antibody by the tanned-cell method (*6*).

Hemagglutinins in all serums were found throughout the γ- and β-globulin regions, with some activity associated with the α-globulins; however, two major antibody peaks were evident (Fig. 1). The γ_2 peaks were sharp, and the faster-moving peaks were broad. Most primary serums had activity in the fast-moving fractions (Nos. 25 to 29), and secondary and hyperimmune serums had little or no activity in these fractions. Nevertheless, delineation of primary and hyperimmune serums from the gross patterns was difficult.

The residual activities of the fractions after treatment with 0.1*M* 2-mercaptoethanol (ME) for 24 hours (*2*) are shown in Fig. 1. Most of the primary hemagglutinins were inactivated. One serum had a small amount of resistant activity in the slowest-moving fraction, and the other primary serum shown had two ME-resistant peaks. Secondary serums had less ME-sensitive activity and two reproducible ME-resistant peaks were resolved; the