Our data are in accord with evidence that points to myelin as the source of encephalitogenic antigen. However, various myelins differ in their properties. Nerve myelin causes neuritis but little EAE. CNS myelin is not species-specific, inasmuch as we produced EAE with spinal cord from mammalian, avian, reptilian, and even amphibian species. However, spinal cord of fish, representing a class further removed from mammals than the foregoing, was inactive. Failure of previous investigators to detect encephalitogenicity of turtle or frog CNS(8,16) may have been due to their use of different recipient species, different route of inoculation, late sacrifice of recipients (after mild lesions have disappeared), or the use of brain or brain-cord mixtures that contain little white matter.

Summary. Tests of spinal cord, brain, white matter, gray matter, glioma, pineal and peripheral nerve tissue homogenates emulsified in Freund's complete adjuvant indicate that, in the rat, encephalitogenicity is proportional to content of CNS myelin. The distribution of the organ-specific encephalitogenic antigen in CNS myelin extends further down the evolutionary tree than has been recognized heretofore, as turtle or even frog spinal cord can produce EAE in rats.

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Dietary Fats and Plasma Lipids in Chicks.* (28633)

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In studies with growing chicks fed cholesterol and fats, Adamson *et al.*(1) observed that unsaturated fat caused greater increase in serum and liver cholesterol than saturated fat. We have previously reported that unsaturated fats like sesame oil and mustard

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TABLE I. Plasma Lipids of Chicks Fed Different Diets for 8 Weeks.

Treatment		Total cholesterol (mg %)	Beta lipoprotein cholesterol (mg %)	Phospho-lipid (mg %)	Triglyc-erides (mg %)	Non-ester fatty acids (μEq/l)	Lipoprotein Alpha (%)	Lipoprotein Beta (%)
Basal diet	(6)	141 ± 12	76 ± 5	246 ± 17	81 ± 9	252 ± 34	63 ± 3	37 ± 3
Idem + cholesterol	(6)	259 ± 29	132 ± 14	255 ± 27	94 ± 10	338 ± 72	48 ± 4	52 ± 5
Basal + mustard oil	(5)	158 ± 7	50 ± 6	274 ± 7	103 ± 15	534 ± 57	72 ± 4	28 ± 4
Idem + cholesterol	(5)	400 ± 59	240 ± 57	264 ± 13	119 ± 4	926 ± 50	30 ± 4	70 ± 4
Basal + coconut oil	(6)	174 ± 10	65 ± 6	322 ± 15	89 ± 20	445 ± 47	69 ± 2	31 ± 2
Idem + cholesterol	(6)	634 ± 83	335 ± 74	279 ± 27	158 ± 25	679 ± 74	26 ± 3	74 ± 3
Basal + sesame oil	(5)	164 ± 20	77 ± 3	300 ± 34	93 ± 13	347 ± 20	66 ± 2	34 ± 2
Idem + cholesterol	(6)	735 ± 82	497 ± 35	295 ± 10	161 ± 15	552 ± 41	21 ± 2	79 ± 2
Basal + hydrogenated groundnut oil	(6)	158 ± 11	50 ± 4	276 ± 20	70 ± 4	510 ± 43	70 ± 2	30 ± 3
Idem + cholesterol	(5)	1036 ±127	741 ±113	340 ± 36	164 ± 17	585 ± 24	15 ± 3	85 ± 5

Figures in parentheses indicate No. of chicks used. Values = Mean ± S.E.

oil produced different effects on plasma cholesterol of monkeys(2,3). Sesame oil was found to be more hypercholesteremic than mustard oil. When rabbits were fed cholesterol dissolved in oil an inverse relation was reported between the increase in plasma cholesterol and the iodine number of the oils used as solvents(4). It has been suggested that absorption of dietary cholesterol might depend on its rate of solubility in dietary or endogenous fat(5).

This report concerns studies on the effects of feeding sesame oil, mustard oil, coconut oil and hydrogenated ground nut oil on plasma lipids of chicks. The possible relation between plasma cholesterol and solubility of cholesterol in the different oils was also studied.

Materials and methods. Male white Leghorn chicks were fed a basal diet(2) for 3 weeks and subsequently divided into various groups, as indicated in Table I. Oils when fed were mixed with the diet at 10% level. Cholesterol when administered was mixed with the diet at 1% level. Chicks were maintained on the different experimental diets for 8 weeks when blood was withdrawn by cardiac puncture using a heparinized syringe. Total cholesterol, β-lipoprotein cholesterol, lipoprotein percentage, phospholipid, triglycerides and nonesterified fatty acids (NEFA) of plasma were estimated(6).

To study the solubility of cholesterol in different oils, crystalline cholesterol was added to different oils taken in centrifuge tubes, stirred with glass rod, kept at 37°C in a constant temperature bath for 2 hours, centrifuged and aliquots of centrifugate used for estimation of cholesterol using the same method as that of plasma cholesterol.

Results. Addition of cholesterol in the basal diet without the oils increased the plasma levels of total cholesterol, β-lipoprotein cholesterol, and β-lipoprotein percentage. Addition of mustard oil, sesame oil and hydrogenated groundnut oil in the diet without addition of cholesterol increased the plasma NEFA values without significant alterations of the other plasma lipids. When coconut oil was added to the diet, increase in total cholesterol, NEFA and phospholipids of plasma was observed. Addition of cholesterol in the diet along with the different oils increased the plasma contents of total cholesterol, β-lipoprotein cholesterol, triglycerides, NEFA and β-lipoprotein percentage with a concomitant decrease in α-lipoprotein percentage. Maximum rise in total plasma cholesterol was observed in chicks fed cholesterol along with hydrogenated groundnut oil and sesame oil.

TABLE II. Solubility of Cholesterol in Different Oils at 37°C.

The oil	Iodine value of the oil	mg cholesterol dissolved/ml of the oil
Mustard oil	104	35.12*
Coconut oil	9	43.49
Sesame oil	110	40.83
Hydrogenated groundnut oil	55	38.96

* Avg of 3 observations.

The rise was minimum when mustard oil was fed along with cholesterol, with intermediate value when coconut oil and cholesterol were administered (Table I).

The solubility of cholesterol was highest with coconut oil and least with mustard oil (Table II).

Discussion. In experiments with chicks we observed a rise in plasma cholesterol after administration of the different oils along with cholesterol. The rise was maximum with sesame oil and minimum with mustard oil. Similar observations were recorded in our studies with rhesus monkeys. We, therefore, could not confirm the observation of Adamson *et al.*(1) as to the effect of unsaturated fat on serum cholesterol of chicks. Although there was not much difference in the solubilities of cholesterol in the different oils, the solubility was comparatively minimum in case of mustard oil. Comparatively lower rise in plasma cholesterol might be due to diminished absorption of cholesterol with mustard oil. This is corroborated by our previous observation on the increased excretion of fecal sterols after monkeys were fed cholesterol and mustard oil(2). The concentration of oleic acid in sesame oil and mustard oil is 49.4% and 32.3% respectively. It has been stated that oleic acid helps in absorption of cholesterol in rats and chicks(7-9). The lower rise in plasma cholesterol after mustard oil might, therefore, be due to its lower oleic acid content. Unlike monkeys, addition of cholesterol to the basal diet of chicks without any oils produced an increase in plasma cholesterol indicating absorption of cholesterol in the absence of oil. This indicated that the mechanism of absorption of cholesterol differs in the different species of animals. The increased plasma cholesterol in chicks fed only coconut oil might be due to the effect of the oil helping reabsorption of biliary or endogenous cholesterol as suggested by Wilkens *et al.*(5). Increased plasma NEFA values after administration of the different oils without cholesterol indicated that after absorption a fraction of fatty acids is transported in unesterified condition. When cholesterol was fed in addition to the different oils, there was a further increase in NEFA values of plasma. This might be due to altered carbohydrate metabolism as indicated previously(10).

Summary. Chicks were fed mustard oil, sesame oil, coconut oil and hydrogenated groundnut oil mixed with the basal diet with or without the addition of cholesterol. The level of oil was 10% and that of cholesterol 1% of the basal diet. The different diets were fed for 8 weeks and plasma contents of different lipids were estimated. Addition of oils alone in the diet increased the plasma NEFA values without producing any change in other fractions of plasma lipids. When the different oils were fed in addition to cholesterol, there was a rise in total plasma cholesterol, β-lipoprotein cholesterol, β-lipoprotein percentage, triglycerides and NEFA values of plasma. The rise in plasma cholesterol was maximum in chicks fed cholesterol along with hydrogenated oil or sesame oil and minimum in chicks fed cholesterol along with mustard oil, with intermediate rise after coconut oil. The solubility of cholesterol was highest in coconut oil and least in mustard oil. Hypercholesteremia does not seem to depend on saturation or unsaturation of the oils or on the solubility of cholesterol in the oils.

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