urea. This result confirms the existence of countertransport for urea as previously reported[6].
Figure 2 shows that, after incubation with NEM, the countertransport phenomenon of urea is completely abolished. The results of figure 2 give further support to the hypothesis that the SH-group reagent inhibits the urea transport interacting directly with the carrier molecule.
On the basis of our experimental results, we have reached the conclusion that the urea carrier molecule has a proteic nature and that SH-residues are involved in the translocation mechanism of the amides.

1 Curci, S., Casavola, V., and Lippe, C., Pflügers Arch. *335* (1975) 267.
2 Curci, S., Casavola, V., Cremaschi, D., and Lippe, C., Pflügers Arch. *362* (1976) 109.
3 Casavola, V., Curci, S., and Lippe, C., Pflügers Arch. *384* (1980) 155.
4 Fonyo, A., Palmieri, F., and Quagliariello, E., Horizons Biochem. Biophys. *2* (1976) 62.
5 Ardizzone, C., and Lippe, C., Boll. Soc. ital. Biol. sper. *58* (1982) 1337.
6 Curci, S. Casavola, V., and Lippe, C., Archs int. Physiol. Biochim. *86* (1978) 243.
7 Cremaschi, D., Montanari, C., Simonic, T., and Lippe, C., Archs int. Physiol. Biochim. *79* (1971) 33.
8 Läuger, P., J. Membrane Biol. *57* (1980) 163.
9 Cremaschi, D., Smith, M.W., and Wooding, F.B.P., J. Membrane Biol. *13* (1973) 143.

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Increased concentration of plasma cholesterol in veal calves fed soyabean lecithin

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Summary. Veal calves (aged about 1 week) were fed a milk replacer without or with soyabean lecithin (2 and 4%; on dry matter basis) for 18 weeks. It was found that lecithin increased the level of plasma cholesterol in a dose-dependent manner.

Lecithins constitute a large family of related compounds differing in the kinds of fatty acids attached to positions 1 and 2 of the glycerol moiety. Soyabean lecithin contains relatively high amounts (up to 70%) of polyunsaturated fatty acids, mainly linoleic acid. There have been reports of beneficial effects of soyabean lecithin supplementation, either i.v. or orally, in human atherosclerosis.[1].
Literature reports as to the effect of dietary soyabean lecithin on the level of plasma cholesterol, a major risk indicator for atherosclerotic diseases, are not conclusive. A striking reduction of the concentration of plasma cholesterol was observed in hypercholesterolemic rhesus monkeys after feeding of soyabean lecithin[2]. In normocholesterolemic chimpanzees soyabean lecithin did not affect plasma cholesterol levels[3]. In hypercholesterolemic patients dietary soyabean lecithin has been found to be ineffective[4,5], or to produce a slight decrease in plasma cholesterol concentrations[6]. In healthy humans given capsules containing soyabean lecithin, a slight (3–6%) fall in plasma cholesterol was seen[7].
We are investigating cholesterol metabolism in the young bovine, which is an excellent model animal for the study of human atherosclerosis. The present study was carried out to see whether dietary soyabean lecithin affects the level of plasma cholesterol in veal calves.
For this investigation male Friesian-Holstein calves were used; they were purchased at a market at the age of about 1 week. The mean initial b. wt was 40.9 kg. The calves were housed individually in wooden boxes with slatted floors. On arrival in the calf house, the animals were randomly divided into 1 group consisting of 73 calves and 2 groups of 51 animals each. During the experiment the control animals were raised on a milk replacer containing 60% (weight percent; on dry matter basis) skim milk powder and 20% crude fat[8]. The other animals were fed either 2 or 4% native soyabean lecithin (Lucas Meyer, Hamburg, FRG). The lecithin was added to these diets at the expense of the fat.
The milk replacers were reconstituted in hot water. On arrival the animals received 147 g air-dry feed per meal, this amount being gradually increased to 1575 g in the 18th week. The calves were pail-fed twice a day (at 09.00 h and 20.00 h). Blood samples were taken from the jugular vein between 10.00 and 12.00 h in the 18th week of the experiment. Plasma was collected by low speed centrifugation. Plasma total cholesterol was determined enzymatically according to Röschlau et al.[9], using the kit (CHOD-PAP) supplied by Boehringer-Mannheim GmbH, FRG. The reproducibility (coefficient of variation) was routinely less than 1.1%.
In the 20th week of the experiment the calves were slaughtered. The mean body weight of all the animals was 215 kg; the average daily body-weight gain was 1243 g. Thus, it can be concluded that the performance of the animals was excellent (cf. Beynen and Van Gils[8]).
The table shows the plasma cholesterol concentrations of the calves after 18 weeks of feeding soyabean lecithin. The inclusion of 2% soyabean lecithin in the milk replacer diet increased the level of plasma cholesterol by 6%, but this increase failed to reach a level of statistical significance. However, when the diet contained 4% lecithin, a significant ($p < 0.01$) increase in the level of plasma cholesterol was

Plasma cholesterol concentrations of veal calves fed liquid diets containing soyabean lecithin

Soyabean lecithin added to diet (weight %)	Number of animals	Plasma cholesterol (mmoles/l)	Relative value
None	72	3.70 ± 0.87	100
2.0	49	3.94 ± 0.82	106
4.0	49	4.20 ± 0.90*	114

Values are expressed as means ± SD; during the trial 5 calves died.
*Vs control group (2-tailed Student's t-test): $p < 0.01$.

observed, when compared with the control diet. There was no correlation between body weight and the level of plasma cholesterol (r= −0.007).

It appears from the present study that the cholesterolemic response to soyabean lecithin in veal calves differs from that in humans and nonhuman primates. In the latter 2 species, no effect[3-5] or a decrease[2,6,7] in plasma total cholesterol were reported, whereas we found that soyabean lecithin elevated plasma cholesterol concentrations in nonruminant calves.

The differential effect of dietary soyabean lecithin on plasma total cholesterol in rhesus monkeys and calves may be related to differences in lipoprotein metabolism. In rhesus monkeys low-density lipoprotein (LDL) particles carry about 70% of total plasma cholesterol, whereas the high-density lipoproteins (HDL) contain about 30%. In rhesus monkeys lecithin caused a 36% decrease in LDL-cholesterol, and an increase of 10% in HDL-cholesterol[2]. Together this resulted in a reduction in total plasma cholesterol concentration of 23%[2]. In calves approximately 80% of the plasma cholesterol is transported by the HDL fraction[8]. Possibly, dietary soyabean lecithin specifically increases the level of HDL-cholesterol. Clearly, further studies are required on this point.

1 Rinse, J., Am. Lab. *5* (1973) 25.
2 Wong, E.K., Nicolosi, R.J., Low, P.A., Herd, J.A., and Hayes, K.C., Lipids *15* (1980) 428.
3 Rosseneu, M., Declercq, B., Vandamme, D., Vercaemst, R., Soetewey, F., Peeters, H., and Blaton, V., Atherosclerosis *32* (1979) 141.
4 Greten, H., Raetzer, H., Stiehl, A., and Schettler, G., Atherosclerosis *36* (1980) 81.
5 Ter Welle, H.F., Van Gent, C.M., Dekker, W., and Willebrands, A.F., Acta med. scand. *195* (1974) 267.
6 Blaton, V., Declercq, B., Vandamme, D., Soetewey, F., and Peeters, H., in: Phosphatidylcholine, p.125. Ed. H. Peeters. Springer, Berlin/Heidelberg/New York 1976.
7 Hawthorne, J.N., Hoccom, M., and O'Mullane, J.E., in: Soya lecithin, nutritional and clinical aspects, p.67. Eds M. Cairella and D. Lekim. Società Editrice Universo, Rome 1981.
8 Beynen, A.C., and Van Gils, L.G.M., Z. Tierphysiol. Tierernähr. Futtermittelk. *49* (1983) 49.
9 Röschlau, P., Bernt, E., and Gruber, W., Z. klin. Chem. klin. Biochem. *12* (1974) 403.

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Auxin effects on root growth and ethylene production

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Summary. Maize root segments were treated with indol-3yl-acetic acid (IAA) and growth effects and ethylene production were analyzed. The increase of ethylene production due to IAA was quite small; therefore it is difficult to conclude that ethylene could – as previously postulated – mediate the growth inhibition induced by IAA.

It has been shown that IAA promotes ethylene production in roots[2,3]. As IAA and ethylene may inhibit root elongation[2,3], it has been suggested that IAA-induced root growth inhibition could be due not to a direct effect of IAA, but to the action of ethylene produced in response to IAA[2,4]. However, when comparing the growth effects of IAA and ethylene both applied to roots, such hypothesis has been discarded[3]. In this paper this question will be reexamined by analysis of the endogenous ethylene production promoted by auxin in maize roots.

Caryopses of *Zea mays L.* (cv. LG 11) were grown in darkness at 19 °C as previously described[5]. After 46 h, rectilinear primary roots of 15±3 mm were selected and 10±0.2 mm apical root segments were prepared under dim green light. They were mounted in plastic frames with their basal cut ends covered with filter paper moistened with 2(N-morpholino) ethane sulfonic acid (MES) (5 mM, pH 6.1) buffer or buffer plus IAA. The frames were then placed in special gas-tight boxes in which a humid atmosphere (90±5% relative humidity) was maintained. Segments were incubated for 6 h in a vertical position, in light (white fluorescent source, $0.9 \pm 6 \times 10^{-2}$ $J \times m^{-2} \times sec^{-1}$)[6] or in the dark. Ethylene production of root segments was measured by gas-chromatography[7]. Root segments were photographed under dim green light at the beginning of the experiments and after 6 h. The lengths were taken from the negatives magnified 3 times.

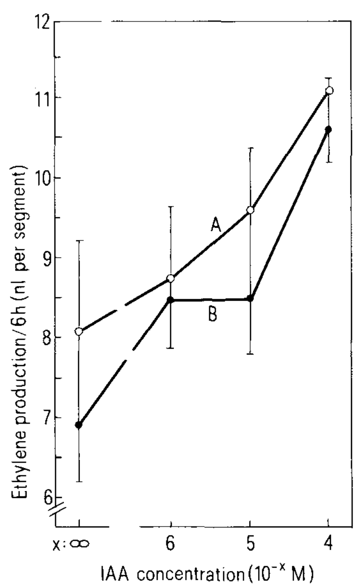

Figure 1. Ethylene production (in nl per 40 segments and ±SE) after 6 h of apical maize root segments. Segments were incubated in a vertical position, in light (A) or in darkness (B).