frequently connect one ecosystem with another, and therefore it is often difficult to determine the limits of a given ecosystem. This has led some ecologists to reject the ecosystem concept as unrealistic and of little use in description or analysis. One is reminded, however, of the fact that it is also difficult, if not impossible, to delimit a species from its ancestral or derivative species or from both; yet this does not destroy the value of the concept. The ecosystem concept may indeed be more useful when it is employed in relation to the community than to the population or individual, for its limits may be more easily determined on that level. Nevertheless, its application to all levels seems fully justified.

The concept of the ecosystem has been described under many names, among them those of *microcosm* (*2*), *naturkomplex* (*3*), *holocoen* (*4*) and *biosystem* (*5*). Tansley's term seems most successfully to convey its meaning and has in fact been accepted by a large number of present-day ecologists. I hope that it will eventually be adopted universally and that its application will be expanded beyond its original use to include other levels of biological organization. Recognition of the ecosystem as the basic unit in ecology would be helpful in focussing attention upon the truly fundamental aspects of this rapidly developing science.

FRANCIS C. EVANS
Institute of Human Biology,
University of Michigan, Ann Arbor

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Hypothermia by Internal Cooling

Mammals normally maintain their body temperatures at a constant and relatively high level. Chemical and other body reactions speed up with increase in temperature and slow down at lower temperatures. Chemical-reaction rates approximately double for each 20-deg rise in temperature.

In surgery it is desirable to slow down body reactions to allow more time for certain operations (*1, 2*). Hypothermia has been used with some success in such work, but the cooling methods that were used introduced several problems, such as ventricular fibrillation, the necessity of prolonged preoperative preparation of the patient, and, most important of all, the biological catastrophe of overreaction of the organism to the stress of the shock of surface cold application (*3*). Cooling the body from the outside requires a long time to extract the body heat through the outer layers of fat and muscular natural insulation (*1, 4*). It seemed to us that a more rapid lowering of the body temperature could be accomplished by internal cooling through the lowering of the temperature of the animal's circulating blood in an external heat exchanger. The cooled blood returning to the body would act as a heat-absorbing and transferring medium to reduce rapidly the body temperature.

To accomplish this, the following procedure is used. After minimal anesthesia with intravenous Nembutal and with tracheal intubation, the animal is connected to a respirator. The carotid artery is cannulated with a polyethylene tube that is threaded through a circulating pump and is then coiled around a spindle that is immersed in a refrigerated alcohol-water bath. The return end of the polyethylene tube is then inserted in the femoral vein.

In a series of 30 dogs, very good results have been obtained. A dog is cooled from 100°F to 80°F in 20 minutes. No cardiac fibrillation, shivering, or shock manifestations are encountered during the procedure. Several animals have been cooled to a complete cardiac standstill and then returned to normal rate and rhythm by rewarming (Fig. 1). It is necessary only to bring the dog up to 90°F, which is above the shivering point. The animal recovers to normal by itself after this.

Rewarming is accomplished by the use of a heating unit in the cooling bath. The refrigeration is shut off, and the heating unit is activated to warm gradually the bath, which in turn warms the circulating blood of the animal (Table 1).

By this method of producing hypothermia by internal heat exchange, the blood and body temperatures may be

Table 1. Temperatures for 11 dogs during hypothermia experiments.

DOG NO.	INITIAL RECTAL TEMP.	MAXIMUM HYPOTHERMAL RECTAL TEMP.	TEMP. CAROTID ARTERY LIMB		TEMP. FEMORAL VEIN LIMB		TEMP. AFTER REWARMING	CONDITION OF DOG
			INITIAL	REWARM	INITIAL	REWARM		
1	100°	80°	78°	72°	72°	79°	96°	FULL
2	102°	80°	86°	80°	71°	86°	94°	RECOVERY
3	104°	85°	37.6°	81°	76°	82°	92°	"
4	100°	82°	87°	84°	67°	84°	94°	"
5	102°	86°	92°	80°	72°	86°	80°	"
6	103°	76°	82°	75°	73°	85°	90°	"
7	100°	78°	85°	76°	76°	84°	88°	"
8	100°	79°	81°	76°	66°	77°	96°	"
9	104°	76°	84°	78°	68°	80°	92°	"
10	100°	80°	78°	82°	66°	78°	88°	"
11	102°	80°	76°	74°	66°	78°	90°	"

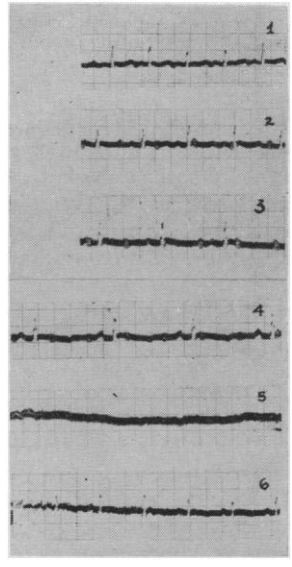

Fig. 1. Cardiographs of dog: (1) normal sinus rhythm, prehypothermia; (2, 3, 4) increasing R-R internal and prophasive delay in repolarization of myocardium, shown by markedly prolonged electric systole, (5) apparent cardiac asystole; (6) sinus rhythm, early posthypothermia.

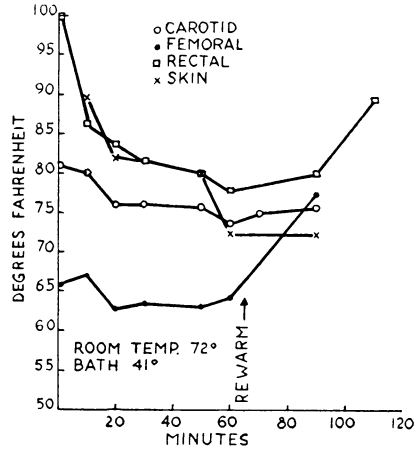

Fig. 2. Related temperatures during hypothermia.

easily and quickly lowered or raised (Fig. 2). Thus, the necessity of a time-consuming prehypothermic state, the shock of surface cooling with the subsequent biological catastrophe of the "stress phenomenon," and the arrhythmia of ventricular fibrillation that are encountered in previously used external cooling methods are eliminated by use of this internal method.

H. B. BENJAMIN
MARVIN WAGNER
Department of Anatomy, Marquette University School of Medicine, Milwaukee, Wisconsin
HARRY K. IHRIG
Research Laboratories, Allis-Chalmers Manufacturing Company and *Department of Biophysics, Marquette University Graduate School*
WALTER ZEIT
Department of Anatomy, Marquette University School of Medicine

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Anaphylactic Shock in Guinea Pigs Sensitized to Polytyrosylgelatin

The lack of antigenicity of gelatin has been explained by the deficiency of aromatic groups in this protein. As a matter of fact, the attachment of O-β-glucosido-N-carbobenzoxytyrosine (*1*) or N-carbobenzoxytyrosine (*2*) to gelatin gave substances which elicited the production of antibodies. The finding of Maurer (*3*) that gelatin shows weak antigenic character in man does not seem to invalidate the assumed role of tyrosine in enhancing antigenicity. In this paper, we want to report the sensitization of guinea pigs by repeated injections of a modified gelatin in which L-tyrosine polypeptides are attached to the free amino groups of gelatin through peptide bonds (*4*).

The polytyrosylgelatin was prepared as follows: O-carbobenzoxy-N-carboxy-L-tyrosine anhydride (*5*) was polymerized in aqueous dioxane solution (1 to 1) at *p*H 7.0 (phosphate buffer) and 5°C in the presence of gelatin (*6*), containing less than 1 percent tyrosine. The carbobenzoxy groups of the polycarbobenzoxy-L-tyrosylgelatin obtained were removed with anhydrous hydrogen bromide in glacial acetic acid, and the product formed was dialyzed against water. The polytyrosylgelatin that was obtained contained 16 percent tyrosine as determined spectrophotometrically. Unlike poly-L-tyrosine, which is soluble in water only in the presence of strong alkali (*5*), polytyrosylgelatin is soluble in water, acids, and bases. Since polytyrosine is insoluble at physiological *p*H, a copolymer of L-aspartic acid and L-tyrosine in a residue molar ratio of 9 to 1 was prepared for comparison.

Guinea pigs weighing 200 to 250 g received intra-abdominally three injections of 0.5, 1.0, and 2.0 ml, respectively, of the substance to be tested for its sensitizing potency. Five-percent solutions of gelatin and polytyrosylgelatin and 1-percent solutions of the copolymer of tyrosine and aspartic acid were used, and the injections were given at 3-day intervals. Fifteen days after the last intra-abdominal injection, all the pretreated animals, as well as an equal number of nontreated controls, received intracardial injections of 0.25 ml of solutions of the substances to be tested for their antigenicity.

Two out of five guinea pigs that were sensitized with polytyrosylgelatin exhibited large drops in body temperature after an intracardial injection of a 0.2-percent solution of the homologous substance, while three showed typical anaphylactic shocks and died (see Table 1). No serious symptoms were observed in nonsensitized animals or in animals that were pretreated with the copolymer, even when 2-percent solutions of polytyrosylgelatin were injected. Gelatin injected as a 5-percent solution, or the copolymer as a 1-percent solution, did not produce in sensitized or in untreated animals any significant symptoms except slight drops in temperature.

The results obtained (Table 1) show clearly that polytyrosylgelatin injected intra-abdominally sensitizes guinea pigs against intracardial injection of the same compound. Since no sensitization was observed by a similar treatment with gelatin, or with a copolymer of tyrosine and aspartic acid, it seems plausible to assume that the attachment of tyrosine peptides enhances the antigenicity of gelatin.

Table 1. Anaphylactic reactions in nonsensitized and sensitized guinea pigs. G, gelatin; PTG, poly-L-tyrosylgelatin, containing 16 percent tyrosine; CAT, copolymer of L-aspartic acid and L-tyrosine in a residue molar ratio of 9 to 1.

Previous treatment	Intracardial injection	Animals (No.)	Death (No.)	Avg. temperature decreases (°C)
Nonsensitized	G	5	0	0.68
G	G	6	0	1.35
Nonsensitized	PTG	5	0	0.80
PTG	PTG	5	3	3.60
CAT	PTG	5	0	0.50
Nonsensitized	CAT	5	0	0.80
PTG	CAT	5	0	1.20
CAT	CAT	5	0	0.40

MICHAEL SELA
EPHRAIM KATCHALSKI
Department of Biophysics, Wiezmann Institute of Science, Rehovoth, Israel
ARYEH LEO OLITZKI
Department of Bacteriology, Hebrew University, Hadassah Medical School, Jerusalem, Israel

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Histological Changes Induced in Soybean Roots by 2,4-Dichlorophenoxyacetic Acid

The anomalous structure caused in the hypocotyl of soybean seedlings by treatment with 2,4-dichlorophenoxyacetic acid (2,4-D) has been reported in an earlier paper (*1*). The present investigation (*2*) is concerned with the histological changes in response to treatment with 2,4-D in the primary roots of soybean seedlings. The method used was essentially the same as that described in the earlier paper (*1*).

Retardation of elongation in the root became apparent on the third day after treatment. The tips of the treated roots were slightly larger in diameter than those of the untreated ones. Histological preparations were made of normal roots and of roots treated with 2,4-D.

Before describing the treatment with 2,4-D, it may be well to review briefly the anatomical structure of the soybean root. The root has a unistratose epidermis. The cortex consists of eight to 11 layers of parenchyma limited on the inside by the endodermis. Immediately within the endodermis lies the pericycle, which is one or two cell layers in thickness adjacent to the primary phloem, and two or three cell layers in thickness opposite the protoxylem ridges. The primary phloem consists of four strands of tissue alternating in position with the protoxylem ridges of the tetrarch structure (Fig. 1).

In the 2,4-D-treated roots, the epider-