

sammenfällt. Der Embryo nimmt nun wieder ventrale Lage ein, doch liegt sein Kopf jetzt am Vorderpol (Abb. 2).

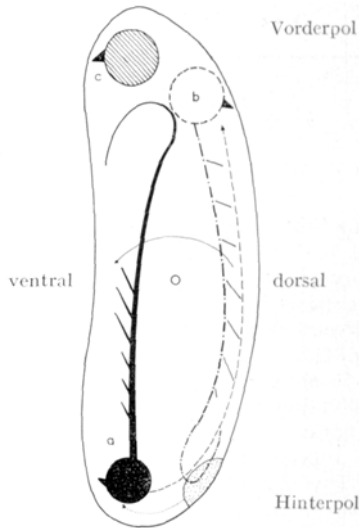


Abb. 2. Schema der Keimentwicklung (Darstellungsweise nach WEBER¹, Fig. 21)

Punktiert: Keimanlage.

a = Lage des Keimes vor der Blastokinese, wobei der Kopfpol durch die Scheibe und die Ventralanhänge durch die abgehenden Striche markiert sind (schwarzer Dorn an der Scheibe gibt Ventralseite an).

b = vorübergehende Lage des Keimes nach der 1. Phase der Blastokinese.

c = definitive Lage des Keimes (nur Kopf eingezeichnet).

Durch Umwachsung des Dotters erfolgt am 41. Tag der Rückenschluss. Der sogenannte Fettkörper wächst dabei streng segmental dorsalwärts. Mit dem 42. Tag werden die nunmehr einsetzenden Kontraktionen des Herzschlauches sichtbar. An einer präformierten Stelle zerreisst das Chorion, und die Larve schlüpft am 54. Tag.

Dieser Eityp repräsentiert den extremen Kurzkeim, wie er unter den Orthopteren am häufigsten vertreten ist (KRAUSE²). Doch unterscheidet er sich von diesen durch die superfizielle Lage des Embryos vor der Blastokinese. Weitere Einzelheiten zur Embryonalentwicklung von *Kalotermes flavicollis* werden in einer ausführlichen Arbeit demnächst bekanntgegeben.

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Schweizerisches Tropeninstitut, Basel, 16. September 1959.

Resumé

Le développement embryonnaire du termite *Kalotermes flavicollis* dure 54 jours à une température de 26°C. Le germe appartient au «type court» (Kurzkeimtyp) selon la classification de KRAUSE², mais se distingue de celui-ci par le fait qu'avant la blastocinèse il ne s'enfonce pas dans le vitellus, mais reste en position superficielle. A partir du 31^e jour, il effectue d'importants déplacements (voir Fig. 2) qui mènent vers le 35^e jour à son orientation définitive dans l'œuf.

¹ H. WEBER, *Grundriss der Insektenkunde*, (Gustav Fischer Verlag, Stuttgart 1954).

² G. KRAUSE, *Biol. Zbl.* 59, 495 (1939).

The Formation of Two Independent Notochords in an Explant Taken from the Dorsal Blastoporal Area of an Early Gastrula of Amphibia

It was shown in our previous report¹ that the tissue taken from the early gastrula of *Hynobius nebulosus* (Urodele) adhered firmly to the collodion membrane and could differentiate on it showing a marked transformation of the configuration. When the square piece taken from the dorsal part of the marginal zone was cultured on the membrane, its upper part spread out eventually forming a thin epithelial tissue, while its lower part congregated to the median and simultaneously stretched towards the lower direction in a first few days of cultivation. Owing to these kinetic processes of congregation and stretching, the ridge-like protrusion was formed just at the lower median of the explant. The histological observation revealed that a single, rod-like notochord with muscles and neural structures always occurred in this protrusion. The organization of these tissues was bilaterally symmetrical. Furthermore, when the lower half of the explant was divided immediately after isolation into two parts by a cut along the median line of the original embryo, the congregation and stretching occurred in each divided arm. These explants yielded two independent notochords each in a congregated portion of a divided arm, which showed a bilaterally symmetrical organization provided with muscles and neural structures.

These findings demonstrate, on one hand, the marked capacity of regulation in the development of the dorsal marginal zone, and on the other hand, a correlation between the congregation and stretching of the tissue and the differentiation of the notochord. This correlation is clear in so far these experiments are concerned. But, it is obscure whether or not it indicates a causal relationship between the two processes. The present experiments are attempted to investigate this problem further.

In the foregoing experiments, two independent notochords were obtained in one explant only when its lower half was divided into two parts by a cut. If the differentiation of the notochord has a close correlation with the congregation of the tissue and not with a mere cut, it should be anticipated that the necessary condition for the formation of two notochords is the formation of two independent congregations in it. Therefore, when two congregations are independently induced by any other methods than dividing the explant by a cut, two notochords should be expected to occur. Following this line of consideration, various types of explantation were tested to induce two congregations in an explant. Among them, the following seemed to be the most useful.

A triangular piece was cut out from the dorsal part of the marginal zone of the early gastrula in such a fashion as is shown in Figure 1. The piece was carried on to the collodion membrane in the culture dish filled with full strength Holtfreter's solution, and reared for about two weeks. In 13 out of 18 available cases, the upper part spread out peripherally, and the lower part began to thicken especially at both angles of the base. However, the thickened areas congregated towards the median of the base in the following two or three days and consequently formed a single protrusion. On the other hand, in the remaining 5 cases, the thickened areas did not congregate towards the median, but remained separate until the end of cultivation. In these cases, two congregations

¹ N. IKUSHIMA, *Mem. Coll. Sci. Univ. Kyoto [B]* 25, 145 (1958).

Relation between the number of congregated portions and the number of notochords in an triangular explant

No. of congregated portions	No. of specimens	Two notochords	One notochord	No differentiation of notochord
two	5	5	0	0
one	13	0	10	3

were formed independently each at either end of the base (Figure 2).

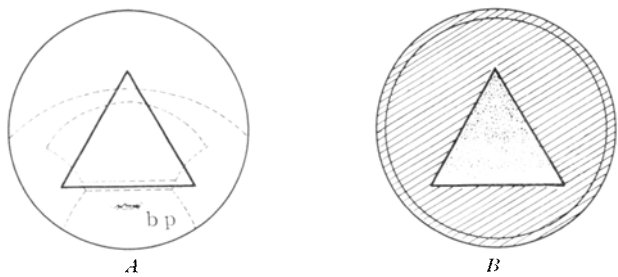


Fig. 1.—Schematic representation of the method of explantation. A Isolation of a triangle shaped tissue from the uninvaginated dorsal blastoporal area. — bp blastopore. B Culturing of the explant on the collodion membrane.

The histological observations revealed that when a single protrusion was formed, a single rod-like or occasionally a dendritic notochord appeared just at its median, except three cases in which a notochord was not found. On the other hand, when the congregations remained separate at both ends of the base, two notochords always occurred, one in each congregated portion (Table). There was no connection between them.

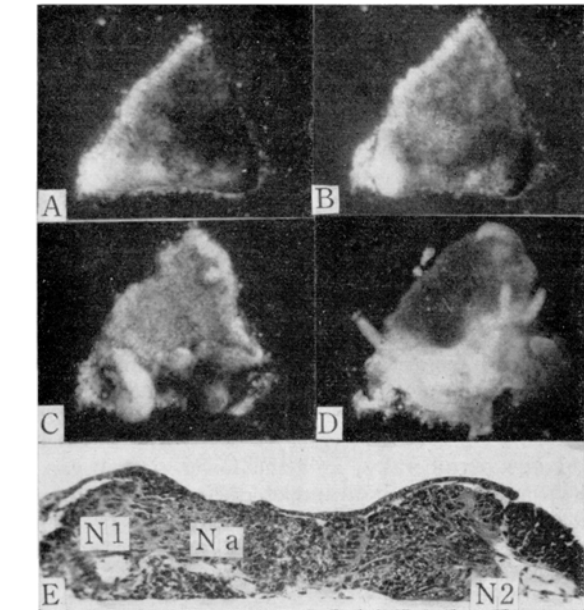


Fig. 2.—Transformation of the shape of an triangular explant in which two independent notochords occur A one hour after isolation; B 24 h after isolation; C on the 5th day of cultivation; D on the 14th day; E notochords in this explant. N1, N2 well differentiated notochord; Na scattered, vacuolated cells

Comparing this result with the preceding one, it can be pointed out that in the square explant two notochords are never formed, provided that its lower half is not divided into two parts by a cut, whereas in the triangular explant, two notochords are formed in 28% of cases without cutting. The formation of two notochords in an explant is thus obtained merely by modifying its shape, instead of dividing it into two parts by a cut. Moreover, it must be noticed that even in a triangular explant two notochords appear exclusively when two congregations occur in it. This fact seems to indicate more definite correlation between the congregation of the tissue and the differentiation of the notochord. From this correlation it may be anticipated that the kinetic process of the dorsal marginal zone plays some important role in the determination of the primordia of the axial mesodermal organs.

The details of description and discussion will be published elsewhere.

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Zusammenfassung

Stücke aus der dorsalen Randzone der frühen Gastrula von *Hynobius nebulosus* wurden in Holtfreterscher Lösung auf Kollodiummembranen gezüchtet. In dreieckigen Explantaten entstehen öfters zwei Chordastränge, während in viereckigen Explantaten stets nur ein Chordastrang gebildet wird. Diese Tatsachen weisen auf die Möglichkeit hin, dass Gestaltungsbewegungen des Explantates bei der Determination der Chordaanlage eine wichtige Rolle spielen.

Urinary Excretion of Aluminium after Administration in Chelated Forms

The extent to which aluminium is excreted in urine, following its administration in chelated form, depends upon the chelating agent used, as is the case with other Group III metals. The skeletal deposition of these metals may be due to the stability of their phosphates.

The introduction of chelated aluminium into the body is of interest in connection with research on prophylactic measures against silicosis¹. Other Group III metals such as yttrium and lanthanum partially deposit in the skeleton and elsewhere after being injected into small mammals as the ethylenediamine tetra-acetic acid (EDTA) chelates. Deposition occurs in spite of the fact that the Y-EDTA and La-EDTA stability constants are far higher than of Ca-EDTA. By trying a number of powerful chelating agents, KROLL *et al.*² found some which gave considerably

¹ D. A. SUTTON, Pneumoconiosis Conference, Johannesburg, February 1959.

² H. KROLL, S. KORMAN, E. SIEGEL, H. E. HART, B. ROSOFF, H. SPENCER, and D. LASZLO, *Nature* 180, 919 (1957).