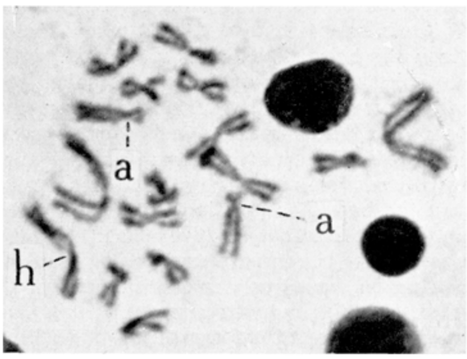
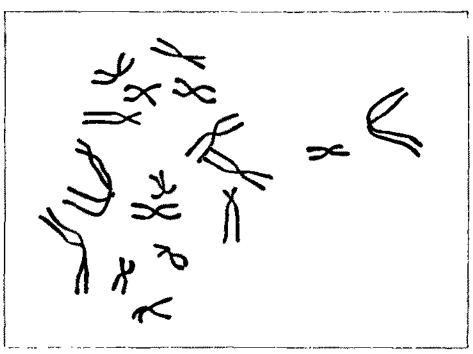
Les combinaisons diagonales seraient léthales, ce qui implique la perte de la moitié des zygotes. Chez un mammifère très fécond, le non-développement de la moitié des œufs peut ne pas être un désavantage sélectif, en raison des meilleurs soins assurés aux jeunes survivants. WHITE a été cependant troublé par le fait que, morphologiquement, l'élément impair du ♂ et de la ♀ ne présente pas de différences, ce qu'il explique par des remaniements structuraux.



A



B

Fig. 2. *Microtus oregoni* ♀. Division myéloblastique. *aa*) la paire d'autosomes acrocentriques; *h*) hétérochromosome métacentrique. *A* Microphotographie. *B* Dessin. × 1800.

Ayant enfin obtenu, au printemps de 1958, quatre ♀♀ de *M. oregoni* (l'expression de ma gratitude va au Dr. J.W. GOERTZ, Museum of Natural History, Corvallis), j'ai pu étudier les cinèses de la lignée myéloblastique et des cellules folliculaires en utilisant des «squashes» de rate et d'ovaire. Le nombre diploïde est encore de 17, mais l'élément impair de la ♀ n'est pas, comme chez le ♂, un acrocentrique à centromère étiré, mais bien un métacentrique à bras sub-égaux (Fig. 2). Chacun de ces bras pourrait correspondre à un X, alors que, dans l'autre sexe, le bras long équivaudrait à l'X, le court à l'Y.

Les processus de la maturation et de la fécondation étant pratiquement inaccessibles, la conception de WHITE donne une explication satisfaisante des faits et se trouve corroborée par mes observations sur *M. oregoni*. On peut cependant remarquer que le nombre de jeunes par portée (2–4 chez *Ellobius*, 3–5 chez *M. oregoni*) n'est pas inférieur à la moyenne générale des Microtinés, Peut-être, y aurait-il surproduction d'ovules? Si tel n'est pas le cas, il faudrait admettre que seuls s'attirent les gamètes à nombre de chromosomes différent (8 + 9).

J'insisterai encore sur le fait que j'ai signalé en 1952 déjà: la formation de types hétérochromosomiques aberrants n'est qu'un aspect particulier de la tendance à la réduction du nombre diploïde par la formation d'éléments métacentriques, par conséquent une illustration du principe du «changement homologue», formulé par WHITE[15] en 1945. Un génome constitué uniquement par des métacentriques signale le terme de l'évolution chromosomique d'un groupe, encore que des remaniements ultérieurs puissent intervenir, comme la chose semble s'être produite chez *Ellobius* (MATTHEY[13]), de ce point de vue encore plus spécialisé que *M. oregoni*.

Enfin, l'étroite parenté entre *Ellobius* et *M. oregoni* devient évidente et cette dernière espèce est à considérer comme un vrai «missing-link».

R. MATTHEY

Laboratoire de Zoologie, Université de Lausanne, le 22 avril 1958.

Summary

(1) *Ellobius lutescens* and *Microtus oregoni* show the same type of sex-chromosomes. The diploid number is odd in both sexes, seventeen.

(2) The odd element of *Ellobius* is morphologically alike in the male and in the female. In *M. oregoni*, the odd element of the male is acrocentric, that of the female metacentric.

(3) Following a hypothesis of WHITE, it seems very probable that the heterochromosome of the male is built of the primitive Y (short arm) and the primitive X (long arm) linked together. In the female of the same species (*M. oregoni*), the sex-chromosome represents both the X fused together.

(4) Only the half of the Zygotes may develope, the other half being lethal.

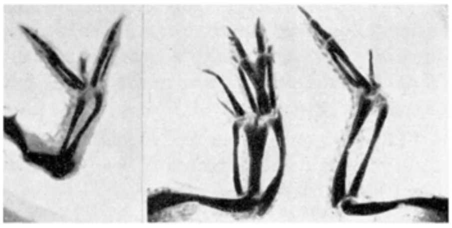
(5) The close kinship between *Ellobius* and *M. oregoni* is certain, a parallel evolution appearing as highly improbable.

[15] M. J. D. WHITE, *Animal Cytology and Evolution* (University Press, Cambridge 1945).

Experimental Observations on Influences Exerted by the Proximal over the Distal Territories of the Extremities

The distal part of the wing anlage of chick embryos (Stages 19 to 24, according to HAMBURGER-HAMILTON) was severed according to a plane of section parallel to the base of the bud, turned 180° round the proximo-distal axis of the bud and reimplanted *in situ*. Changes in the organogenesis of the hand steadily occurred under this condition, viz., supernumerary skeletal pieces, mostly entire fingers with metacarpal bones and phalanges, total or partial specular reduplications of the whole hand or of some of its constituents developed (Fig. 1, *A*). Such developmental changes did not take place when the severed distal part of the wing bud was reimplanted *in situ* without rotation.

The occurrence of supernumerary segments is apparently related to the developmental stage of the wing anlage at the time of grafting and to the distance of the plane of section from the base of the wing bud. Starting from stage 19, the whole free portion of the wing bud severed from its base and reimplanted *in situ* after a 180° rotation forms a normally structured wing whose ventro-dorsal axis is reversed. Up to stage 22, supernumerary skeletal segments develop if the 180° rotated part amounts to no more than the distal half of the whole wing anlage. At the stages 23 and 24, segments in excess or reduplications form only when the 180° rotated distal part represents no more than $^1/_3$ and respectively $^1/_4$ ca. of the whole bud[1].



A B

Fig. 1.—*A*, embryo 505, 11 days, Lundvall staining. Distal third of the wing anlage reimplanted rotated 180° *in situ* (St. 21). *B*, embryo 515, 13 days. *Left*, distal half of the right wing anlage reimplanted rotated 180° *in situ* (St. 20); *right*, normal controlateral wing.

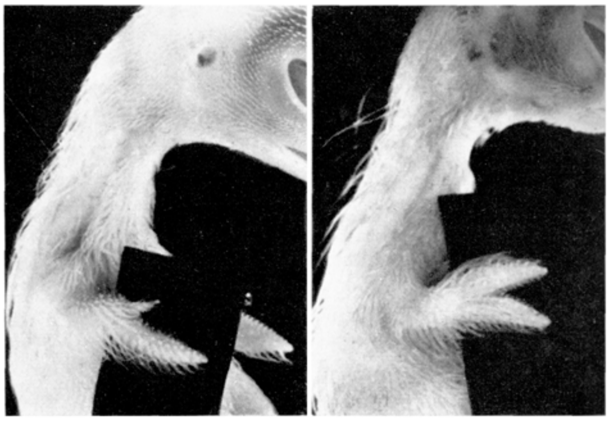
The consequences of the experiments are not substantially different when the 180° rotated distal part of the anlage is grafted over the cut surface of the base of the bud after removal of a large intermediary zone of the latter (Fig. 2). In this case, the presumptive territories of the hand, which lay in the rotated distal portion, are implanted over the arm district included in the proximal stump; the presumptive material of the forearm is discarded, more or less completely depending on the extent of the removed portion of the anlage and on the developmental stage of the embryo.

When the division of the distal half of the wing anlage and its reimplantation after 180° rotation is performed on embryos at stages 19 to 21, skeletal segments in excess may form also in the forearm: e.g., a thick cartilaginous element may develop between the normal radius and ulna (Fig. 1, *B*).

When the distal part of the limb bud (St. 19 to 24) is grafted to the dorsal surface of the trunk in the somite region, a normal distal part of the wing forms; its ventrodorsal axis is reversed if the graft underwent a 180° rotation round the proximo-distal axis of the wing anlage; it is not reversed when the graft did not undergo such rotation. Supernumerary segments never formed under these conditions. In the latter experiments, the distal portion of the wing anlage was laid down with its cut surface over a suitable bed prepared by removing the epidermis and a thin layer of the underlying mesenchyme which covers the somites 15 to 20; the craniocaudal axis of the graft was arranged parallel to the longitudinal axis of the embryo.

The observations reported show that: (1) supernumerary parts form from the mesenchyme of the rotated distal portion of the wing anlage reimplanted in the wing district, and (2) their development apparently depends on influences exerted by the proximal portion of the wing bud which does not undergo rotation.

The formation of segments in excess does not seem to depend on a splitting in two parts of the mesenchymal territories already segregated and determined, which could become separated from each other as a consequence of the 180° rotation of the grafted material. In this case, each one of the two parts of the bisected territory could form the entire territory through a regulative process; therefore, two distinct segments could develop instead of the normal single one. But this assumption may be disposed of for the following reasons: (1) The maps of the mesenchymal territories of the wing drawn from carbon-marking experiments show that the mesenchyme from which the hand is formed becomes segregated under the apical ectodermal ridge only after stage 22 and it is represented till stage 24 merely by a thin semilunar disto-marginal sector of the wing anlage (AMPRINO and CAMOSSO[2]). Therefore, till stage 24 the whole mesenchyme from which the hand develops is completely included in the distal third or fourth of the wing anlage. (2) Carbon particles laid down on the cut surface of the proximal two-thirds (or $^3/_4$) of the wing anlage and then covered by the rotated distal third (or fourth), separate neatly the parts of the wing which develop from the graft and respectively from the rest of the bud. The position acquired by the carbon marks during later stages of development show that the normal as well as the supernumerary parts of the hand have their origin exclusively in the material of the graft. The carbon-marking experiments show also that bisection of the territories of the forearm (St. 21 to 23) or of the arm (St. 19 to 20) may occur; however, supernumerary segments develop constantly in the hand, with much less frequency in the forearm and never in the arm. (3) Supernumerary segments form from the rotated graft when the intermediary zone of the wing bud is removed before reimplantation of the distal third (or fourth) of the anlage. In this case, the proximal portion of territoires which could have been divided into two parts could not possibly participate in the development of the wing.



A B

Fig. 2.—11-days embryos. Distal third of the wing anlage reimplanted rotated 180° (*B*) and not rotated (*A*) after removal of a large intermediary zone of the wing bud (St. 22).

Moreover, the development of wing parts in excess does not seem to depend on influences exerted over the mesenchymal territories of the hand by the epidermal crest, which covers the distal region of the anlage and which is rotated together with the underlying mesenchyme in the experiments here reported. In fact: (1) according to SAUNDERS and ZWILLING[3], the apical crest has no in-

[1] An analogous operation was performed in chick embryos (St. 19 to 23) by J. W. SAUNDERS and M. T. GASSELING (Anat. Rec. *121*, 360 [1955]) to study the symmetry relations of wing parts. In one case (out of 13) supernumerary segments formed in the distal part of the wing.

[2] R. AMPRINO and M. CAMOSSO, Arch. Biol. *67*, 613 (1956); Roux, Arch. (1958), in press.

[3] J. W. SAUNDERS, Anat. Rec. *105*, 567 (1949). – E. ZWILLING, J. exp. Zool. *132*, 157 (1956).

fluence on the determination of the cranio-caudal axis of the wing for rotations of 180°; (2) in the present experiments, the normal qualitative and quantitative relationships between apical crest and the underlying mesenchyme remain unchanged after 180° rotation of the distal part of the wing anlage; (3) when the distal part of the anlage rotated 180° round the proximo-distal axis of the bud is grafted to the somite region, supernumerary segments do not develop; the normally structured wing which forms from the graft shows merely an inversion of its ventrodorsal axis.

In conclusion, the organogenetic changes which take place in the distal part of the wing anlage in consequence of its 180° rotation *in situ* seem to depend on influences spreading from the proximal materials of the wing bud; in other words, the development of the still undetermined (or incompletely determined) distal mesenchymal territories would be governed by the already well determined proximal territories. This assumption is further supported by the following observation: supernumerary segments develop from the 180° rotated distal part of the wing anlage when the latter is grafted over the *lateral* surface of the base of the wing bud freed of its epidermal covering, viz. over the territories of the shoulder and the proximal part of the arm.

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Institute of Human Anatomy, Polyclinic, University of Bari (Italy), March 17, 1958.

Résumé

Les résultats de diverses séries d'expériences, exécutées sur l'ébauche de l'aile d'embryon de poulet aux stades 19–24 suivant HAMBURGER-HAMILTON, permettent d'envisager l'existence d'influences organogénétiques provenant des territoires proximaux du mésenchyme du bourgeon qui règlent le développement des territoires distaux.

A Transplantable Fibroma of the Skin in the Newt *Triturus taeniatus*

Whereas in fishes several cases of fibroma have been described[1], we know only two in amphibians, viz. a fibroma of the mouth in the frog *Rana esculenta*[2] and a subcutaneous fibroma in the Japanese giant salamander *Megalobatrachus maximus*[3]. Concerning the development of these tumours, no data are given in the pertaining papers. We have personnally observed a multiple fibroma of the skin in six adult individuals of the newt, *Triturus taeniatus*, viz. in four males and two females from the same litter[4]. As in all cases some small or very small nodules were present in the vicinity of the tumour, which invariably consisted of one or more circumscribed tumours, the first developmental stages could be studied.

When the sections of these small and very small nodules were stained with PAP's ammoniacal silver method, as modified by MITCHELL and WISLOCKI[5] (counterstain paracarmine), particular structures of the basal membrane were visible in the form of nodular swellings. A preliminary investigation showed that these swellings in the tumour region were strongly enlarged and would for this reason probably play a certain role in the development of this tumour.

The small nodular swellings of the basal membrane corresponded satisfactorily with the similar structures described in the newt, *Triturus viridescens*, in which an adepidermal reticular network had been observed[6]. Also in *Triturus taeniatus*, an adepidermal reticular network appeared to be present, which had a structure identical to that of the corresponding network in the skin of *Triturus viridescens*. It is composed of nodules from which radiate fine fibrillae, which are arranged tangentially to the epidermis. These nodules are probably formed from the cytoplasm of the basal cells of the epidermis and in their turn give rise to the formation of fibrils. The fibrils of the nodular swellings are closely connected with the reticulum of the dermis and with the basal cells of the epidermis.

In the development of this fibroma four stages could be distinguished, viz.:

(1) Enlargement of the nodular swellings of the adepidermal reticular network.
(2) Continued enlargement of the nodular swellings and concentration of fibroblasts in the vicinity of the swellings.
(3) Formation of new fibrils from the enlarged nodular swellings, a densely structured network thus being formed round the fibroblasts.
(4) Fusion of the concentrated masses of fibroblasts. The impression is gained that the enlarged nodular swellings must be considered as an induction centre, which, with the aid of chemical substances, cause a local concentration of the fibroblasts.

Following this investigation transplantation experiments were performed with skin fibromas of 19 tumour-bearing newts, obtained by breeding the normal animals of the first litter. In these experiments, small pieces of tissue, from the vicinity of the small tumours in which an enlargement of the nodular swellings of the adepidermal reticular network could already be expected, were transplanted in a tumour-free region of the same animal. In 13 of the 19 cases, a distinct tumour at the location of the transplantation developed after about 3 weeks, the same developmental stages being observed. The histological examination of the six negative cases revealed that the transplanted material had been almost completely resorbed.

On the strength of the rather high frequency of this fibroma of the skin in *Triturus taeniatus*, the tumour must probably be considered as a species-specific tumour according to SCHLUMBERGER[7].

A. STOLK

Histological Laboratory, Free University, Amsterdam, March 28, 1958.

Zusammenfassung

Beschreibung eines transplantierbaren Fibroms der Haut im Streifen- oder Teichmolch *Triturus taeniatus*, bei dessen Entstehung das adepidermale retikulare Geflecht eine bedeutende Rolle spielt.

[1] H. G. SCHLUMBERGER and B. LUCKÉ, Cancer Research *8*, 657 (1948).
[2] L. VAILLANT and A. PETTIT, Bull. Mus. Hist. nat. Paris *8*, 301 (1902).
[3] E. SCHWARZ, Z. Krebsforsch. *20*, 353 (1923).
[4] A. STOLK, Proc. Akad. Sci. Amst. (in press).
[5] A. J. MITCHELL and G. B. WISLOCKI, Anat. Rec. *90*, 261 (1944).
[6] M. SINGER and J. S. ANDREWS, Anat. Rec. *109*, 346 (1951); Acta anat. *28*, 313 (1956).
[7] H. G. SCHLUMBERGER, Cancer Research *17*, 823 (1957).