Behavioural properties of chick somitic mesoderm and lateral plate when explanted in vitro

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SUMMARY

Tissue culture, time-lapse cinematographic and electron microscopic techniques have been used to study the properties of chick mesoderm at several stages of differentiation. Lateral plate, unsegmented mesoderm (segmental plate), and newly formed somites were dissected from stage-12 embryos, whilst dermo-myotomes and sclerotomes were dissected from stage-18 embryos. Each type of mesoderm was found to exhibit a characteristic pattern of behaviour.

The explants from the unsegmented mesoderm, from the newly formed somites and from the older embryos could be placed in a developmental sequence; with increasing differentiation they settled and spread on the substrate more readily, whether explanted as pieces of tissue or as individual cells, and it was concluded that this implied an increased adhesion to the substrate. Similarly, with increasing differentiation, the cells segmented at a faster rate. No significant differences could be discerned in the internal structure of the different types of cells, although differences in the general shape were apparent.

The lateral plate mesoderm cells, which bear some resemblances to the unsegmented mesoderm cells in the embryo, also show some morphological resemblances to them in vitro. However, the lateral plate cells had a much greater success in attaching to glass or plastic substrates. They were also found to have the highest speed of locomotion of all the tissues studied, whereas the unsegmented had the lowest. It is concluded therefore, that although cells may look similar to one another morphologically, their behaviour may differ greatly, probably because they are already partially determined.

INTRODUCTION

Tissue culture techniques have long been used to investigate the behaviour and properties of cells, but it is curious how little they have been employed to study the behaviour of embryonic cells during the very earliest stages of differentiation. In a recent paper, Bellairs and Portch, (1977), showed that when unsegmented mesoderm and recently formed somites were dissected from the embryo and grown under identical conditions in tissue culture, they exhibited...
striking differences in behaviour. These differences were related to the morphological and behavioural changes associated with somite segmentation.

In the present paper, we have carried out additional investigations on the unsegmented and segmented mesoderm, and have also used the same techniques to study the behaviour of the lateral plate mesoderm, as well as that of the dermo-myotomes and the sclerotomes of the differentiating somites of older embryos. We have shown how these differences in behaviour reflect the differentiation of the somites.

**MATERIALS AND METHODS**

(a) **Tissues.** Hens’ eggs were incubated for 48 h or for 68 h so that the embryos were at either about stage 12 or stage 18 of Hamburger & Hamilton (1951). Because the process of segmentation begins at the anterior end and spreads posteriorly, there is a gradient of developmental stages along the axis of the body, the anterior regions being in advance of the more posterior ones. By contrast, the lateral plate mesoderm forms a continuous sheet from its anterior to its posterior end, and there is as yet no morphological sign in it of any antero-posterior differentiation.

In the present investigation, three different developmental stages of somitic mesoderm and one of lateral plate were distinguished in stage-12 embryos:

(i) Unsegmented mesoderm, which is present as a thick band of tissue, the segmental or paraxial plate, which runs longitudinally down either side of the trunk neural tube and notochord.

(ii) Posteriorly situated somites, which are newly segmented and have not yet begun to differentiate into dermo-myotomes and sclerotomes.

(iii) Anteriorly situated somites, which have already begun to form dermo-myotomes and sclerotomes.

(iv) Lateral plate mesoderm.

At stage 12, 16 pairs of somites are present, but by stage 18 a further 20 or more pairs have formed and there is little unsegmented mesoderm remaining; the differentiation of most of the somites into dermo-myotomes and sclerotomes is well advanced in these later embryos.

(b) **Techniques for tissue culture.** Embryos were removed from the yolk and treated with 0.1 % trypsin (Difco) in Ca²⁺- and Mg²⁺-free buffered Tyrode’s solution at 37 °C until it was possible to dissect the tissues cleanly from one another. In the main series of experiments, somites from stage-12 embryos were cultured intact but those from stage 18 were dissected into dermo-myotomal and sclerotomal components which were cultured separately. Unsegmented, and lateral plate mesoderm were explanted in pieces which were of comparable sizes to the somites. In a further series of experiments, each of the tissues was disaggregated into separate cells by using 0.1 % EDTA in Ca²⁺- and Mg²⁺-free buffered Tyrode’s solution for about 15 min. Specimens were cultured in sitting
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Fig. 1. Diagram of two chick embryos at stages 12 and 18, respectively, to show the location of the four types of mesoderm which have been utilized in the present investigation. Sections through the embryos at different levels are also shown.

drops, either on glass or on collagen-coated glass or on Falcon plastic dishes. The medium used was Earle's 199: calf serum: penicillin-streptomycin (GBCO Cat. 600-5075) in the proportion 9:1:0·5. The cultures were maintained for periods ranging from 18 to 56 h.

c) Techniques for filming. Time-lapse filming was carried out on cultures which had been explanted 12 h previously and had begun to grow well; these were converted to standing columns as described by Jacobson (1967). In this technique, the coverslip on which the hanging drop culture is growing lies above another coverslip, the space between them being filled by a continuous column of culture medium. The films were taken on a Bolex camera attached to a Zeiss
standard WL microscope and a Wild Variometer apparatus, using a 16× phase contrast objective and an interval of 12 s. Some additional specimens were cultured on Falcon plastic dishes as sitting drops.

Measurements were made of the relative speeds of 38 individual cells that had separated from the main explant. Each film was projected onto a sheet of paper at a standard magnification, and tracings were made of the nucleus of each cell at successive intervals of 100–200 frames. The total magnification of each nucleus was 1400× in each drawing. About 20–30 drawings were made for each cell and the distances moved were measured from the centre of the nucleus in one position to its centre in the next. The mean distance per frame, and hence the speed of each cell could thus be calculated.

(d) Techniques for light and electron microscopy. Cultures prepared for light microscopy were fixed in formal-saline for 24 h, washed in 70% alcohol and subsequently stained in Harris’ haemotoxylin. After dehydration, they were mounted in Canada Balsam. Cultures prepared for transmission electron microscopy were fixed in 3% phosphate-buffered glutaraldehyde for about 1 h at room temperature (about 15 °C) then washed three times in buffer. They were then treated with 1% osmium tetroxide in phosphate buffer. After dehydration in graded ethanols, followed by two changes of propylene oxide, they were embedded in Araldite. Sections were stained in 2% uranyl acetate at 38 °C for 20 mins and then counter-stained with lead citrate.

Eleven embryos were also prepared for transmission and staining electron microscopy, using a similar technique (for details, see Bellairs, 1979).

RESULTS

Some of the differences in behaviour between explants of unsegmented and segmented mesoderm which were reported in a previous paper (Bellairs & Portch, 1977), have been confirmed and extended in this study. Essentially, these were:

(a) The proportion of successful outgrowths was less with the unsegmented than with the segmented mesoderm. This appeared to be because the unsegmented explants had greater difficulty in attaching to the substrate.

(b) The general appearance of the outgrowths from the two types of tissue differed, and in particular, there were fewer spaces between the cells in the explants from unsegmented (Figs. 22, 23) than from the segmented tissues (Figs. 24, 25). A correlated difference was that the edges of the cells of unsegmented origin were in contact over larger distances, so that these explants each had a continuous epithelial-like appearance, whilst there were fewer contacts between the cells from segmented mesoderm, so that these explants had a more open appearance.

(c) When the areas of the cells were measured in fixed preparations, those of the unsegmented mesoderm were usually greater than those of the segmented.
(d) Using time-lapse cinematography, it appeared that the cells from the unsegmented mesoderm migrated at a more leisurely pace than those from the segmented.

These results have been supplemented by the presented studies. Our additional findings are based on the following approaches:

1. Unsegmented and segmented mesoderm

(a) Samples of the tissues were examined by TEM immediately after dissection in trypsin (Fig. 2). The tissue was still recognizable morphologically although the cells were found to be slightly vacuolated. The desmosomes were apparently intact. When sections of the unsegmented and segmented explants were examined by TEM after 18 h in culture, no striking differences could be found between them. In each series there was overlapping of the lamellae and sometimes also of the cell bodies (Figs. 7, 8). Both fully elaborated desmosomes (Figs. 7, 10) and simpler cell surface contact specializations (Fig. 11) were present. Orientated bands of microfilaments beneath the cell surface were particularly conspicuous in the explants of segmented mesoderm (Fig. 8) but were also visible in those of the unsegmented mesoderm. The tips of the lamellae were relatively free of large cell organelles (Fig. 9) and contained mainly ribonucleo-protein and glycogen granules. Contact points with the substrate were visible (Fig. 9). By contrast, the main body of the cell in the region of the nucleus was richly supplied with Golgi bodies, mitochondria with well organized cristae, small amounts of rough-surfaced endoplasmic reticulum and clusters of ribonucleoprotein and glycogen granules (Figs. 11, 12).

(b) If the two types of tissue were explanted onto a collagen substrate instead of glass, the behavioural differences were reduced though not eliminated. The segmented explants now behaved more like the unsegmented. Thus, they appeared to have more difficulty in attaching to the substrate, and tended to remain in close contact with one another.

(c) The unsegmented and segmented mesoderm were dissected from a batch of 40 embryos, and each tissue was dissociated into individual cells which were then plated out into Falcon plastic dishes and placed in a CO₂-gassed incubator. Few cells from the unsegmented mesoderm settled during the first 18 h, (Fig. 3) but those that did tended to be aggregated into small, localized, islands. By contrast, many of the cells from the segmented mesoderm settled and became fibroblast-like in shape (Fig. 4). Inspection of the cine-films of tissues explanted on glass (see below) showed that those cells which settled and became adherent to the substrate, rapidly extended and spread. Thus, the shape of a cell may be taken as an indication of whether or not it is attached to the substrate. Each culture of dissociated cells was therefore examined every 2 h and counts were made in three standard-sized areas which were chosen at random and which differed each time. The numbers of round and of spread cells were counted, and the number of spread cells was expressed as a percentage of the whole. Each
Fig. 2. T.E.M. section of the unsegmented mesoderm of an embryo of stage 12 which had been subjected to trypsinization to aid in dissection. Note that large spaces have appeared between the cells and there are some vacuoles within the cells. × 3.5

Fig. 3. Phase contrast photograph of cells from unsegmented mesoderm (stage-12 embryos) which had been dissociated and plated out on Falcon dishes. After 18 h of culture, few of the cells have spread or aggregated. × 100.

Fig. 4. Phase contrast photograph of cells from recently segmented mesoderm (stage-12 embryos) which had been dissociated and plated out on a Falcon dish. After 18 h of culture, many cells have spread and aggregated. × 100.

Fig. 5. Phase contrast photograph of cells from lateral plate mesoderm (stage-12 embryo) which had been dissociated and plated out on a Falcon dish. After 18 h culture, many cells have spread and aggregated. × 100.

Point represents counts on 400–600 cells. One such series of results is shown in Fig. 6; after 8 h only 5% of the cells from the unsegmented mesoderm have settled and spread whereas 62% of those from the segmented mesoderm have done so. By 18 h the figures are 9% (unsegmented) and 75% (segmented). In another series, the figures were 3% (unsegmented) and 58% (segmented) after 6 h; with 9% (unsegmented) and 93% (segmented) after 18 h.
(d) When explants were investigated by time-lapse cinematography, it was found that each type of tissue exhibited certain characteristics, as follows:

Unsegmented mesoderm (Figs 16, 22, 23). The cells were usually broad with wide lamellae and seldom possessed fibroblast-like shapes. They underwent ruffling at their free borders and also at the leading edge. They tended to be in close contact with one another and did not often break free, even at the extreme edge of the explant. Their rate of migration appeared to be slower than that of the cells of the segmented mesoderm and this was confirmed by measurements (Table 1).

Segmented mesoderm (Figs 17, 24, 25). These cells were usually fibroblast-like in shape and their lamellae tended to be restricted to the leading edge. They were not in such close contact with one another as the cells of the unsegmented mesoderm, so that large intercellular spaces were visible. In comparison with the cells of unsegmented mesoderm, those of the segmented tissue broke away more readily from the explant, though they often drew out long retraction fibres behind them. These cells not only appeared to move faster than the unsegmented ones, but they showed more over- or underlapping with one another.
Table 1. Speed of migration of different cell types

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Mean distance/frame (µm)</th>
<th>s.D.</th>
<th>Number of cells measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral plate</td>
<td>0.385</td>
<td>0.10</td>
<td>8</td>
</tr>
<tr>
<td>Unsegmented</td>
<td>0.066</td>
<td>0.04</td>
<td>6</td>
</tr>
<tr>
<td>Segmented</td>
<td>0.109</td>
<td>0.03</td>
<td>8</td>
</tr>
<tr>
<td>Dermo-myotome</td>
<td>0.217</td>
<td>0.07</td>
<td>10</td>
</tr>
<tr>
<td>Sclerotome</td>
<td>0.219</td>
<td>0.04</td>
<td>6</td>
</tr>
</tbody>
</table>

Speed of migration of different cell types, calculated by measuring the change in position of the nucleus on projections of time-lapse cinefilms. The difference in speed between the dermo-myotome cells and the sclerotome cells was not significant but when the speeds of any of the other tissues were compared using the *t* test, they were found to be significant. (*P* < 0.05).

2. Lateral plate mesoderm

The explants of the lateral plate mesoderm appeared to be intermediate in many ways between those of the unsegmented and of the segmented mesoderm. When the tissues were examined *in situ* in the embryo at stage 12 (Bellairs, 1979), the lateral plate cells resembled those of the unsegmented mesoderm, both in their general shape and in the fact that they possessed only simple cell contact specializations. They also resembled them in some ways when explanted *in vitro*. The general appearance of the explants was similar in that both the unsegmented and the lateral plate mesoderm explants appeared compact, like a sheet, except at the periphery, and the cells tended to be flat and broad and

Figures 7-12

Fig. 7. T.E.M. section of an explant of unsegmented mesoderm from a stage-12 embryo, fixed after 18 h in culture. Note the desmosome where one cell overlaps another (arrows). × 46000.

Fig. 8. T.E.M. section of an explant of newly segmented mesoderm from a stage-12 embryo fixed after 18 h. in culture. Note the bundles of microfilaments where one cell overlaps another (arrows). × 23 700.

Fig. 9. T.E.M. section of unsegmented (segmental plate) mesoderm from a stage-12 embryo, fixed after 18 h in culture. The section passes through a lamella at the edge of the culture. The white triangle represents the culture dish. Note the contact points with the substrate (arrows). × 9000.

Fig. 10. T.E.M. section of an explant of newly segmented mesoderm from a stage-12 embryo, fixed after 18 h in culture. Note the desmosome where one cell overlaps another. × 67 000.

Fig. 11. T.E.M. section of unsegmented mesoderm from a stage-12 embryo fixed after 18 h in culture. Simple cell surface contact specializations are present (arrows). × 19 000.

Fig. 12. T.E.M. of an explant of newly segmented mesoderm from a stage-12 embryo, fixed after 18 h in culture. × 14 200.
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For legend see page 52.
For legend see page 52.
usually in contact with one another. This means that there were relatively few spaces between the cells in the main body of the explant (Fig. 26). At the extreme edge of a lateral plate explant (Fig. 18) the shape of the individual cells was intermediate between that of those seen at the edge of explants of unsegmented (Fig. 16) and segmented (Fig. 17) mesoderm.

When the explants of lateral plate mesoderm were examined by TEM, they showed multilayering similar to that seen in cultures of both the unsegmented and segmented mesoderm (Figs. 13, 14), and in addition were often equipped with numerous microfilaments and with elaborate desmosomes. (Fig. 14). When examined by SEM, explanted lateral plate cells appeared to be particularly rich in anchoring filaments and to show considerable overlapping or underlapping (Fig. 15).

The ability of the lateral plate explants to attach to the substrate appeared to be greater than did that of the unsegmented explants but less than that of the segmented ones. Thus, 66% of the lateral plate explants settled and spread, whereas 32% of the unsegmented explants and 78% of the segmented ones did so. Similarly, when the lateral plate mesoderm tissue was dissociated into

**Figures 13-15**

Fig. 13. T.E.M. section of lateral plate mesoderm from a stage-12 embryo, fixed after 18 h in culture. × 29000.

Fig. 14. T.E.M. section of lateral plate mesoderm from a stage-12 embryo, fixed after 18 h in culture. Note the microfilaments and desmosomes, where one cell lies on another. × 20000.

Fig. 15. S.E.M. of lateral plate mesoderm from a stage-12 embryo, fixed after 18 h in culture. Note the anchoring filaments and the over- or under-lapping. × 2200.

**Figures 16-21**

Fig. 16. Edge of an explant of unsegmented mesoderm (taken from a stage-12 embryo), after 24 h in culture. Enlargement of a frame from a 16 mm cine-film. The cells are broad with wide lamellae and are in close contact with each other. × 360.

Fig. 17. Edge of an explant of newly segmented mesoderm dissected from a stage-12 embryo. Enlargement of a frame from a 16 mm cine-film. The cells are fibroblast-like and there are many intercellular spaces. Some crossing-over can be seen (arrowed). × 360.

Fig. 18. Edge of an explant of lateral plate mesoderm dissected from a stage-12 embryo. Enlargement of a frame from a 16 mm cine-film. The cells are intermediate in appearance between those in explants of unsegmented (Fig. 15) and segmented (Fig. 17) mesoderm. × 360.

Fig. 19. Edge of an explant of dermo-myotome dissected from a stage-18 embryo. × 360.

Figs. 20, 21. Edge of an explant of sclerotome dissected from a stage-18 embryo. Enlargements of two frames from a cine-film showing the same region. Note the way the cells are crossing over one another, and the change in cell shape undergone by the isolated cell in Fig. 20 when it comes into contact with other cells in Fig. 20. × 360.
individual cells and plated onto Falcon dishes, many of the cells reaggregated and spread. Comparison of Figs 3, 4 and 5 suggests that they behaved more like the segmented than the unsegmented mesoderm. However, counts taken of the cells which had spread and settled, showed that the rate was intermediate between that of the unsegmented and segmented cells (Fig. 6).

By contrast, in the cine-films, the cells from the lateral plate mesoderm appeared to migrate considerably faster than those from both the unsegmented mesoderm and the segmented mesoderm. This was confirmed by the measurements summarized in Table 1.

3. Later stages

The dermo-myotomes (Figs 19, 28, 29) and sclerotomes (Figs. 20, 21, 30, 31) of stage-18 embryos were easily dissected from one another and each of the two types settled readily on the glass substrate.

The explants of dermo-myotomes were more sheet-like in appearance than those of the sclerotomes, and they displayed patches of highly aligned cells (Figs. 28, 29). Their speed of migration appeared to be faster than that of the younger tissues, and this was confirmed by the measurements (Table 1).

The explants of the sclerotomes resembled those of the whole somites from the stage-12 embryos in several ways; the general appearance of the explants was similar, the cells were even more fibroblast-like in shape and there were well-marked intercellular spaces. In the cine films however cells from the sclerotomes appeared to migrate faster than those from the segmented mesoderm, which was confirmed by the measurements (Table 1). They also appeared to move even faster than those from the dermo-myotomes, though this could not be confirmed by the measurements. There was much more overlapping of cells in the sclerotome cultures than in any of the other types of culture. This can be seen in the stills from the cine film (Figs. 20, 21). These sequences show the rapid changes in cell shape that accompany the contacting of one cell by another.

DISCUSSION

In a recent paper (Bellairs, Sanders & Portch, 1978) we showed that when ectodermal and neural tissues were isolated from the chick embryo and grown in tissue culture, they each exhibited characteristic behaviour patterns at different stages of development.

The main finding of the present paper is a similar one: When different types of mesoderm are dissected from the embryo and grown in tissue culture, they each behave in a different manner. Both in our previous paper and in this, our aim has not been to try to obtain further differentiation but rather to subject the cells to a standard environment in which we were able to examine their characteristic responses.
The main point for discussion in the following paragraphs is: 'What relevance has this behaviour of the mesoderm cells in vitro to the normal behaviour in situ in the embryo?'

Let us first consider the differences between the unsegmented mesoderm, the newly segmented somites and the older more differentiated somites; we discuss the lateral plate below. Some of these differences have already been described by Bellairs & Portch (1977), but additional ones have been presented in the present paper. Perhaps the most striking is that the least differentiated tissue, the unsegmented, is also the one in which the proportion of successful explants was the smallest; (and furthermore was the one from which isolated cells had the least success in attaching and spreading on Falcon dishes). Similarly, the dermomyotome and the sclerotome, which were derived from the most differentiated somites, were the ones in which the highest proportion of successful explants was obtained. It seems likely therefore that with increasing differentiation, the somite mesoderm becomes more adhesive to the substrate, whether it be glass or plastic.

We may then enquire, 'Does an increase in adhesiveness to the substrate reflect an increase in adhesiveness to other cells?' The answer is that it does in some tissues, although not in all. Let us consider the case of the unsegmented mesoderm and the newly formed somites taken directly from the embryo. Bellairs, Curtis & Saunders (1977) have shown that when the cell to cell adhesiveness of disaggregated cells is measured using a Couette viscometer, it is less in the cells from the unsegmented mesoderm than in those from the newly segmented somites. It seems likely therefore that a gradually increasing adhesiveness spreads down the axis as segmentation takes place (Bellairs, 1979). The present results suggest that this difference in adhesiveness between the unsegmented and the segmented mesoderm is of such a fundamental nature that it remains even under culture conditions. In these tissues therefore there is indeed a relationship between the ability to adhere to the substrate and to other cells.

**Figures 22–27**

Fig. 22. Explant of unsegmented mesoderm after 24 h in culture. Note that the cells are closely packed together with few intercellular spaces. Fixed and stained preparation (cf. Fig. 24). × 39.

Fig. 23. Higher magnification of the edge of the explant shown in Fig. 22. Note the broad, almost triangular appearance of the cells (cf. Fig. 25). × 162.

Fig. 24. Explant of segmented mesoderm after 24 h in culture. Note that the culture is more open in texture than that shown in Fig. 22 and that many intercellular spaces are present. Fixed and stained preparation. × 39.

Fig. 25. Higher magnification of the edge of the explant shown in Fig. 24. Note the fibroblast-like shape of the cells. × 162. (Cf. Fig. 23.)

Fig. 26. Explant of lateral plate mesoderm after 24 h in culture. × 39.

Fig. 27. Higher magnification of the edge of the explant shown in Fig. 26. × 162.
Fig. 28. Explant of a dermo-myotome after 24 h in culture. Note the sheet-like nature of the explant and the regions of highly aligned cells. Fixed and stained preparation. × 39.

Fig. 29. Higher magnification of the edge of the explant shown in Fig. 28. Note the close packing of the cells. × 162.

Fig. 30. Explant of a sclerotome after 24 h in culture. Note the many intercellular spaces. Fixed and stained preparation. × 39.

Fig. 31. Higher magnification of the edge of the explant shown in Fig. 30. Note the fibroblast-like shape of the cells. × 261.
Another difference between the types of somitic mesoderm is in their behaviour as explants, as seen in the cine-films. With increasing differentiation certain cells appear to be more motile. Those from the sclerotome were more fibroblast-like in shape and moved more quickly than those from the newly segmented mesoderm, which in their turn were more fibroblast-like and moved faster than those from unsegmented mesoderm. In the dermo-myotome cultures, which remained sheet-like, cells also grew out at a faster rate than from the recently segmented mesoderm. The increased motility may be related to an increased ability to adhere to the glass; it is well-known that locomotion is dependent on adequate adhesion to the substrate (Trinkaus, 1976). Another factor may be that the older tissues have more collagen associated with them in culture, just as they have in the embryo (Bellairs, 1979); collagen fibrils appear to play an important role in guiding migrating sclerotome cells in the embryo (Ebendal, 1977) and in promoting the movement of fibroblast cells in culture (Elsdale & Bard, 1972). Similarly, it is likely that more glycosaminoglycans are secreted by the older tissues in culture than by the younger ones, though we have no direct evidence on this point.

The presence of desmosomes in the explants seems to make little difference to the motility of the cells, since they were found in all types of culture. Similarly, although there are many desmosomes in newly segmented somites (Bellairs, 1979) the cells appear to be able to break away readily from the tissue when it is explanted. This is not due to the effect of the light trypsinisation that was carried out to aid in dissection, since desmosomes were still present at the time of explantation.

It is perhaps not surprising that the sclerotome cells should be so active, since they normally move away from the dermo-myotome soon after they are formed, and migrate toward the notochord (Bancroft & Bellairs, 1976). The sclerotome cells of mouse embryos also are highly motile in culture (Flint, 1977). The dermo-myotome is however a double sheet of epithelium, and this may be the reason why its cells tend to remain in an aligned sheet-like manner even in the explants. Alignment of cells in culture is often associated with contact inhibition of locomotion (Harris, 1974), and it may be that the dermo-myotome is the most contact-inhibited of all the tissues we have studied here. In these experiments, we have shown that once the dermo-myotome cells manage to break away from the explant, they are able to migrate at a similar speed to the cells from the sclerotome.

One of the most interesting aspects of the results is that the lateral plate mesoderm resembles the unsegmented mesoderm in appearance but differs from it in behaviour. It appears to be more adhesive to the substrate, since it attaches more readily (Fig. 6), and this may be reason why its cells migrate more speedily ((Table 1). However, since the lateral plate and unsegmented (paraxial plate) mesoderm do not form a developmental sequence but undergo differentiation along separate lines, there is no reason to expect an identity of behaviour.
In other words, although the cells may look very similar morphologically, they are nevertheless already partially determined in their respective fates. Indeed, according to Packard (1978) the unsegmented (paraxial plate) mesoderm at this stage is already 'committed' toward somite formation.

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