LETTERS TO THE EDITOR

AN APPARATUS FOR STARCH GEL ELECTROPHORESIS

Since its advent (Smithies, O. 1955, Nature 175: 307; Biochem. J. 61: 629; Hunter, R. L. and Markert, C. L. 1957. Science 125: 1294), starch gel electrophoresis has gained a world-wide popularity owing to the excellent resolving power and the easiness of manipulation. The apparatuses commercially available at the present are, however, unnecessarily large in size and so requires a considerable amount of

Fig. 1. Illustrating the method of preparation of a small apparatus for starch gel electrophoresis. The size of the apparatus can be varied in various ways.
starch gels for each run (about 500 ml). Use of such large gels is uneconomical, particularly in the case of enzyme stainings which require some expensive substrates and cofactors in quantities. It is well known that the resolution of ionic components in a mixture in gel electrophoresis does not simply depend upon the distance of migration of the components. In addition, more than one half of the total length of the gel is unnecessary for the demonstration of slowly migrating components. Therefore, reduction of the size of gels could be safely made without sacrificing the resolution.

This report briefly describes the method of preparation of a handy apparatus which can be made only within 30 min if the worker is an electron microscopist accustomed to cut glass plates into any shape. METHOD: (1) Prepare 8 pieces of glass plates, the sizes of which are given in Fig. 1. Glass plates 5–6 mm thick generally used for making knives for ultrathin sectioning can be conveniently employed as materials. (2) Stick nos. 1–4 plates together with an appropriate glue, such as epoxy resin. These constitute the main body. (3) Stick nos. 6 and 7 plates together in such a way to sandwich an acrylic resin plate, no. 8, one side of which is filed to make six square projections. These constitute the slot former. (4) Before use, nos. 5 and 9 plates and the slot former are stuck on to the main body with Cemedine C (a synthetic glue which easily comes off after electrophoresis; Cemedine Co.). (5) Pour degassed starch gels (ca. 60 ml) into the apparatus and cool more than 1 hr in a refrigerator or by immersing the lower part of the apparatus in an ice-cold water bath. The gels thus prepared are ready to use. (6) For sample application, insert

![Fig. 2. A: Glucose 6-phosphate dehydrogenase zymogram from rat liver (Wistar-King A strain). W: 1:2 whole homogenate. Mt, Mc and Sap: 5,000×g precipitate, 32,000×g precipitate and 32,000×g supernatant of the 700×g supernatant of 0.25 M sucrose homogenates, respectively. Electrophoresis was performed for 5 hrs. at 10 mA per column at 4°C. B: Non-specific esterase zymograms from rat livers. Alpha-naphthyl acetate was used as substrate. Rats used were of strains of ACI/N (A), Kyoto-notched (K) and Wistar-King A (WK), and female and male F1 hybrids of ACI/N and Kyoto-notched (F1). Electrophoresis was performed for 7 hrs. at 10 mA per column at 4°C. Anode is at the bottom.](attachment:image.png)
the tip of a spatula in between the slot former and no. 1 or 2 and carefully remove the former from the main body. (7) Place samples in the slots and apply an adhesive tape so as to enclose the space previously occupied with the slot former. (8) Remove no. 9 plate and place bridges made of gauze and filter paper on both sides of the apparatus as illustrated in Fig. 1. (9) After electrophoresis, remove no. 5 plate and take the gel out of the body, slice if desired and stain. Electrophoresis can be performed either horizontally or vertically.

Two zymograms are shown in Fig. 2 as examples. The procedures are simple, the results, reproducible, and the expenses, less than one tenths of the conventional method.

March 26, 1971

Samuel H. Hori, Tsutomu Kamada and Satoshi Yonezawa

Department of Zoology, Hokkaido University,
Sapporo