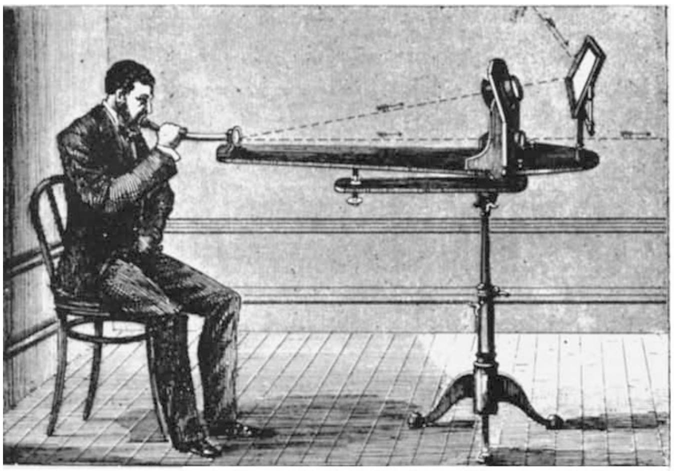
Friedmann cosmology, the observed angular velocities of separation correspond to speeds far in excess of the speed of light (see M. H. Cohen *et al. Nature* **268**, 405; 1977). The relativistic beam model mentioned above can explain this phenomenon as a consequence of shortened observed arrival intervals of successively emitted wave fronts. This is caused by the motion of the emitting plasma, which approaches the observer almost as rapidly as do the radio waves (see M. J. Rees *Nature* **211**, 468; 1966). From the above discussion, one can therefore predict that PKS0735 + 178 should also be engaged in such 'superluminal' expansion. Further VLBI monitoring of this source should allow radio astronomers to test this prediction and thereby increase our understanding of compact radio sources. □

Hot foot

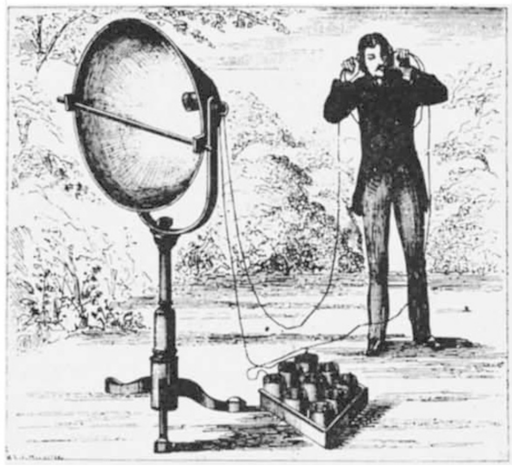
from Clive Lloyd

CONSIDERING its location at the boundary between cell and environment, it is not surprising that the fibroblast's focal adhesion plaque or 'foot' has become a fashionable meeting point for a whole gaggle of animal cell biologists. The reasons for investigating the foot by interference reflection microscopy are diverse — the study of microfilament bundle attachment, cell locomotion, morphology and virus infection — but in coming together at this site, these studies raise universal issues of cell behaviour and growth control.

In a previous article (News & Views *Nature* **279**, 473; 1979), it was reported that extracellular fibronectin and cytoplasmic microfilament bundles had been seen to be co-linear across the membrane suggesting that α-actinin provided the linkage between microfilament and membrane in such an assembly. However, research moves so quickly in this field that, already, several refinements are required of this model. α-actinin does not seem to occur sufficiently close to the dense plaque of epithelial *zonulae adhaerentes* junctions for it to be the mediator of actin's linkage to the membrane (Geiger *et al. Proc. natn. Acad. Sci. U.S.A.* **76**, 2833; 1979). Further work is required to define its location as it is detected within analagous focal adhesion plaques isolated from the cell body (Badley *et al. Expl Cell Res.* **117**, 231; 1978; Rohrschneider & Shriver *Eur. J. Cell Biol.* **22**, 521; 1980). The current view seems to be that α-actinin collects actin microfilaments laterally to form bundles — a function also tentatively assigned to a new 130 K protein first found as a contaminant in preparations of gizzard α-actinin. When used to stain cultured chicken cells, antibodies raised against this protein (Geiger *Cell* **18**, 143; 1979) produce a punctate pattern at the ventral surface. These sites turn out to be focal adhesion plaques and Geiger concludes that "the 130 K protein plays a more direct role than either α-actinin or tropomyosin in the association of actin filaments with the cell membrane". In addition, the protein has been shown to terminate microfilament



The articulating photophone. The transmitter.



The selenium receiver.

100 years ago

BELL'S PHOTOPHONE

BY the courtesy of Prof. Graham Bell we are at length able to do somewhat ampler justice to his latest discovery than has hitherto been possible. He has supplied us with certain details not hitherto published, and has also furnished us with drawings of his apparatus and experiments.

Our readers are already aware that the object of the photophone is the transmission of sounds both musical and vocal to a distance by the agency of a beam of light of varying intensity; and that the first successful attempts made by Prof. Bell and his co-labourer, Mr. Sumner Tainter, were based upon the known property of the element selenium, the electric resistance of which varies with the degree of illumination to which it is exposed. Hence, given a transmitting instrument such as a flexible mirror by which the vibrations of a sound could throw into vibration a beam of light, a receiver consisting of sensitive selenium forming part of an electric circuit with a battery and a telephone should suffice to translate the varying intensities of light into corresponding varying intensities of electric current, and finally into vibrations of the telephone disk audible once more as *sound*. This fundamental conception dates from 1878, when in lecturing before the Royal Institution Prof. Bell announced the possibility of hearing a shadow fall upon a piece of selenium included in a telephone circuit. The photophone, however, outgrew the particular electrical combination that suggested it; for not the least of the remarkable points in this research is the discovery that audible vibrations are set up in thin disks of almost every kind of material by merely throwing upon them an intermittent light. Hence in theory, if not in practice, the receiver may be reduced to the divine simplicity of a mere disk of vulcanite or of zinc; on one side of which the listener listens.

We may classify the forms of photophone under two heads, as (1) articulating photophones, and (2) musical photophones; the former being able to transmit speech because they work by beams of light whose intensity can vary in undulatory fluctuations, like those of vocal tones; the latter being able to transmit simple musical tones only, since they work by mere interruptions of a fixed beam of light. The greatest distance to which articulate speech has yet been transmitted by the selenium-cell-photophone is 213 metres, or 233 yards.

Whatever be the future before the photophone, it assuredly deserves to rank in estimation beside the now familiar names of the telephone and the phonograph.

From *Nature* **23**, 4 November, 15, 1880.

0028-0836/80/450013-02$01.00