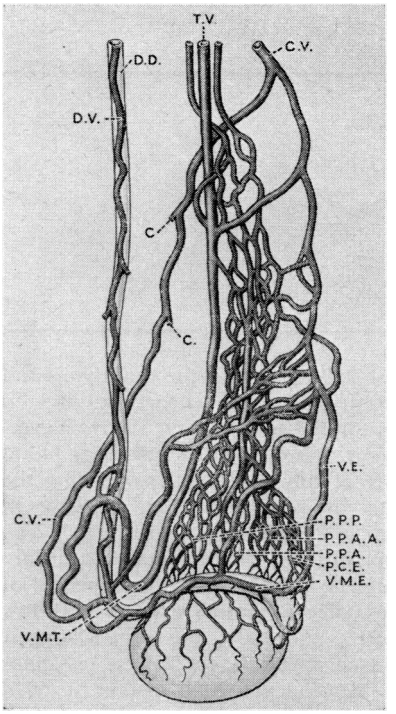

Fig 2 *Diagram showing the venous drainage of the right testis, viewed from the lateral aspect.* C., *communicating vein between cremasteric (not shown in figure) and pampiniform plexuses.* C.V., *cremasteric vein.* D.D., *ductus deferens.* D.V., *deferential vein.* P.C.E., *plexus capitis epididymicus.* P.P.A.A., *plexus pampiniformis anterior accessorius.* P.P.A., *plexus pampiniformis anterior.* P.P.P., *plexus pampiniformis posterior.* T.V., *testicular vein. Venæ comitantes of this vein flank it on either side, and will eventually join the main vein.* V.E., *vena epididymica.* V.M.E., *vena marginalis epididymidis.* V.M.T., *vena marginalis testis*

which eventually forms the testicular vein itself, is continuous at the cauda epididymidis with a prominent marginal vein of the testis, which passes towards the cauda from the mediastinum. This marginal vein also anastomoses with the cremasteric and deferential veins and with a marginal vein of the epididymis, whose main route of drainage is into a vena epididymica at the head of the epididymis and the deferential vein at the tail. The vena epididymica drains largely into the cremasteric vein. In addition, the caput epididymidis has its own special drainage by way of a separate plexus into the pampiniform plexus.

It may be envisaged, therefore, that any venous back pressure which exists in the cremasteric veins is capable of exerting untoward influence on the epididymis as well as the testis; it is therefore interesting to note that MacLeod (1965) has found the most marked changes in semen pattern, in the presence of varicocele, to involve sperm morphology and that the most general and striking improvements, following high ligation of the testicular vein, occur in sperm motility.

A reappraisal of the diagnosis and treatment of varicocele is urgently necessary, with particular reference to the ætiology of this condition, the treatment of which is now more rational anatomically and successful. If the surgeon is ever mindful of the eventual fertility of a patient with varicocele, the unsatisfactory results of the former classical operation of resecting the pampiniform plexus might well be avoided.

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The Influence of Temperature on Flow of Blood in the Testis and Scrotum of Rats

In 1964, Setchell, Waites & Till used the technique of Sapirstein (1958) for measuring flow of blood in the testis of the rat and ram. The method rests upon the ability of tissues to concentrate certain intravenously administered radioactive substances and to hold them at a constant level for a period of time. Setchell *et al.* (1964) showed that 4-^{131}I-iodoantipyrine was a suitable substance and already it has been utilized to assess changes in blood flow within the testis during artificial cryptorchidism (Glover 1965). However, surrounding structures, such as the tunica vaginalis and the scrotum, might normally be expected to influence the reaction of the testis to local changes in the environment; therefore, throughout the present work, which deals with local variations in temperature, the testes have been confined within the scrotum. The scrotum of different rats was exposed to several different

Table 1

Mean estimates of blood flow following thirty minutes' exposure to each temperature (The figures in brackets show the ranges of variation in estimates obtained)

		Blood flow (ml/g/min)			
Temperature	*No. of animals*	*Testis*	*Epididymis*	*Tunica vaginalis*	*Scrotum*
Controls (20° approx.)	6	20·7 (19·6–22·5)	14·1 (11·7–17·4)	9·9 (6·9–20·1)	6·4 (3·8–9·0)
−10°C	3	3·0 (0·6–5·8)	3·1 (0·8–5·7)	2·6 (0·4–6·6)	1·5 (0·3–4·5)
0°C	4	6·4 (6·0–7·7)	7·0 (3·5–11·4)	2·8 (1·5–5·5)	4·7 (1·1–8·4)
41°C	3	33·6 (25·2–40·6)	31·5 (23·4–38·6)	29·0 (13·8–49·8)	12·8 (7·2–15·7)
43°C	3	41·4 (30·3–51·5)	41·2 (32·4–55·3)	29·7 (25·2–38·8)	26·4 (19·5–37·8)

Table 2

Mean percentage increase in blood flow following exposure of scrotum to two different temperatures for different periods of time

Environmental temperature	*Time (min)*	*No. of animals*	*Mean percentage increase* *Testis*	*Epididymis*
41°C	15	6	8	5
43°C	15	2	29	73
41°C	30	3	47	123
43°C	30	3	100	131

temperatures and estimates of blood flow were made. Changes in blood flow evoked by exposure of the scrotum to these temperatures are represented in Fig 1 and Tables 1 and 2.

Conclusions

Under the conditions of these experiments, it does seem that individual responses in blood flow were not entirely consistent, but blood flow in the scrotum of the rat responds sluggishly to variations in external temperature and that this is in contrast to events occurring in cremasteric and epididymal blood vessels. In the testis increased blood flow following warming of the scrotum is less striking than in the epididymis and this is in conformity with earlier findings in artificial cryptorchidism (Glover 1965). Nevertheless, it seems that changes in testicular blood flow are more readily achieved by warming the scrotum than by cooling it. An increase in testicular temperature of about 10°C to 12°C, brought about in these experiments by exposure of the scrotum to 41°C or 43°C for a period of thirty minutes, effected an increase in blood flow of between 50% and 100% but results suggest that it would be necessary to depress testicular temperature by at least 20°C before a 50% diminution of blood flow could be expected. This would agree with the work of MacDonald & Harrison (1954), which showed a reluctance of the testicular artery to constrict in response to cold, and does not conflict with the findings of Cross & Silver (1962) on changes in oxygen tension induced by temperature variation. Qualitatively this reaction to cold appears to apply even more to epididymal and cremasteric blood flow. Histological evidence indicates that generally the ultimate degree of testicular damage incurred by changes in external temperature can be related to more immediate changes in blood flow. However, the problem of cause and effect remains obscure for, whilst a detrimental effect of vasoconstriction is not surprising, it seems unusual for an organ to respond adversely to an increase in its blood flow *per se*. If methods other than temperature change could be used to influence blood flow in the scrotum and its contents, this problem might well be solved. Preliminary results obtained using ^{86}Rb-rubidium chloride instead of ^{131}I-iodoantipyrine confirm changes in testicular blood effected by variations in temperature, and the details of these results will be presented elsewhere.

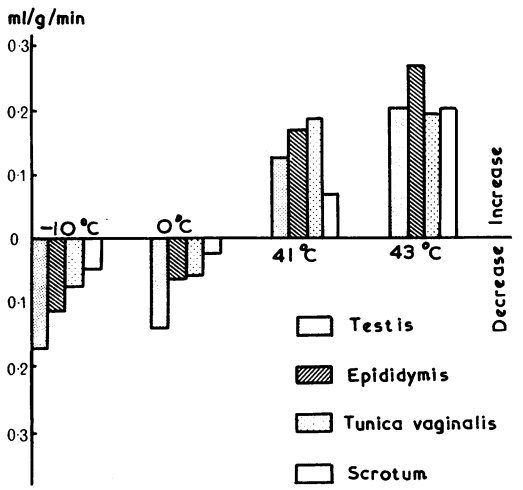

Fig 1 *Mean changes in blood flow after thirty minutes' exposure to four different temperatures*

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