

**Who quotes and in which publication:** Squire, John

The Structural basis of muscular contraction.

Plenum Press. New York and London. 1981

**Transliteration of the Last name:**

The surname of the author of the kinetic theory, V.I. Deshcherevsky, in this book is transliterated as Descherevsky and also as Deshcherevski:

Page 626 Deshcherevski, Page 630 Descherevski, Page 666 – Deshcherevski

**The cited work of V.I.Deshcherevsky in the list of references of the quoting article:**

*Page. 666.* References

(1968) Biofizika **13**, 928-935. (In Russian).

[Deshcherevsky V.I. Dve modeli myshechnogo sokrashcheniya (Two models of muscular contraction). Biofizika **13**, № 5, 928—935 (1968)]

**Quote**

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Using the rate constants  $f(x)$  and  $g(x)$  shown in Fig. 11.4b (values calculated by Julian, 1969), A.F. Huxley's 1957 theory could account satisfactorily for both the force-velocity curve from A.V. Hill's results (Hill, 1938; Fig. 11.5) and the relationship between load and energy liberation. It also explains in a natural way the difference between the effects of shortening and lengthening in the force-velocity curve (Fig. 11.5), where the speed of lengthening under a load greater than the isometric tension ( $P_0$ ) is much slower than would be expected from extrapolation from shortening speeds for loads less than  $P_0$  (Hill, 1938; Katz, 1939). Note, however, that only the kinetic properties of the model lead to this agreement (Deshcherevski, 1968), and other models with different chemical and structural assumptions but the same kinetics would serve as well in accounting for the observations.

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Let us now turn to the type of experiment carried out by Jewell and Wilkie (1958) and illustrated in Fig. 11.2. It seems that the formulations of A. F. Huxley (1957) and Descherevski (1968) will account well for the predicted time course of the redevelopment of tension following a length step just sufficient to cause the tension during an isometric tetanus to fall to zero. It also appears that Podolsky and Nolan's model will probably do just as well (White and Thorson, 1973). However there are significant differences between the two classes of model, apart from their ability to account for the length transients shown in Fig. 11.7. In particular, the number of cross bridges attached under different steady-state conditions are clearly different in the two cases. If the number of bridges attached at displacement  $x$  at time  $t$  is  $n(x,t)$  then the rate of change of  $n(x,t)$  with time is a function of  $f(x)$  and  $g(x)$  such that

$$\frac{dn(x,t)}{dt} = f(x) [1 - n(x,t)] - g(x)n(x,t)$$

By making use of the appropriate values for  $f(x)$  and  $g(x)$ , the distribution of attached bridges during steady-state shortening conditions can be calculated (A. F. Huxley, 1957; Podolsky and Nolan, 1972). The results from this are illustrated in Fig. 11.8, and it is clear that A. F. Huxley's model predicts a decrease in attachment number when speed increases, whereas Podolsky and Nolan's predictions show an increased attachment under the same conditions. We shall return to this difference later in the chapter since, in theory, it can be investigated by X-ray diffraction methods.