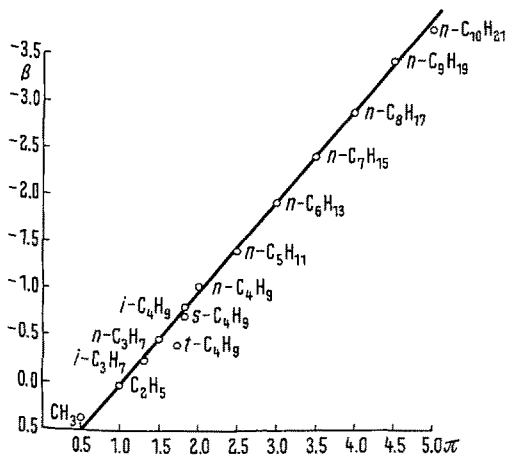
A Correlation Between Constants Used in Structure-Activity Relationships

Attempts to correlate quantitatively the magnitude of the biological activity and the chemical structure of organic compounds has recently met with increasing success. The principle consists in the application of linear free energy relationships, known from physical organic chemistry, to biological problems. If the efficiency-determining step is a chemical reaction, HAMMETT's[1] and TAFT's[2] equations can be used for this correlation successfully, and the group contributions to the activity can be expressed with the help of σ- or σ^*-constants. This was proved, for example, on the growth inhibition of *Staphylococcus aureus* by G-penicillins[3] or *Escherichia coli* by *m*- and *p*-substituted phenyl isothiocyanates[4] respectively.

About 10 years ago work was started dealing with studies on structure-activity relationships. In the first stage, this work was concentrated upon the group of compounds in which the efficiency-determining step is a physical phenomenon characterized by the solubility or partition coefficient, respectively. In a number of studies[5-8] constants were derived, characterizing the substituent independently of the nature of the biological object studied and the type of compounds. These constants, which ZAHRADNIK called β-constants, correlate with R_M-constants, as measured on thin layers by BOYCE and MILBORROW[9], and correlate therefore also with the partition coefficients of these substances. In recent years HANSCH and co-workers have applied the so-called π-constants to structure-activity relationships[10,11]. These constants characterize the contribution of a group to the partition coefficient. In their last work[12], which is solely dedicated to series of compounds whose biological activity is determined by a physical process, there are π-constants mentioned which excellently correlate with ZAHRADNIK's β-constants (see Figure). Both types of constants were successfully applied to a number of compound types as well as to biological objects[7,12]. We would like to stress the excellent mutual correlation of both sets of constants.



Zusammenfassung. Ein wechselseitiges Verhältnis zwischen den β-Konstanten von ZAHRADNIK und den π-Konstanten von HANSCH, die bei Strukturaktivität-Beziehungen verwendet werden, wird beschrieben.

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Regeneration of Feline Dorsal Roots

There is unanimous agreement regarding the capacity of the mammalian dorsal spinal nerve roots to regenerate as long as their regenerating axones are growing within the neurilemmal portion of the root (GUTH[1]). The growth of regenerating dorsal root fibres is inhibited at the zone of root entry, and the fibres are not capable of growing into the cord. However, histological observations of regenerating fibres have occasionally shown these to pass into the cord (CAMPBELL[2]).

This investigation dealt with the ability of feline dorsal root fibres to regenerate after their transection. For surgical restoration of the root continuity end-to-end, a tubulation technique with a Millipore microfilter was used. Judging from bioelectrical and histological data, severed lumbosacral dorsal root fibres were able to regenerate along their extramedullar portion (Figure 1). No physiological evidence of fibres transversing the neurilemmal-neuroglial junction could be demonstrated.

In a modification of the experimental technique, the distal part of the severed dorsal root was anastomosed to the proximal part of an adjacent (alien) ipsilateral dorsal root, which had been transected peripherally to its ganglion (Figure 2). Thus, the preganglionic portion of the rostral root used for anastomosing was left intact. The regenerative process could then proceed from the ganglion in a

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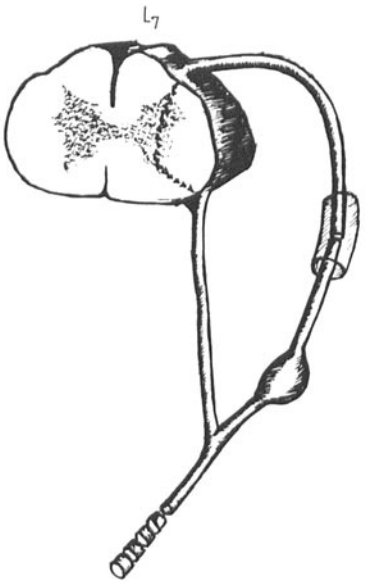

Fig. 1. A dorsal root anastomosis proximal to the dorsal ganglion.

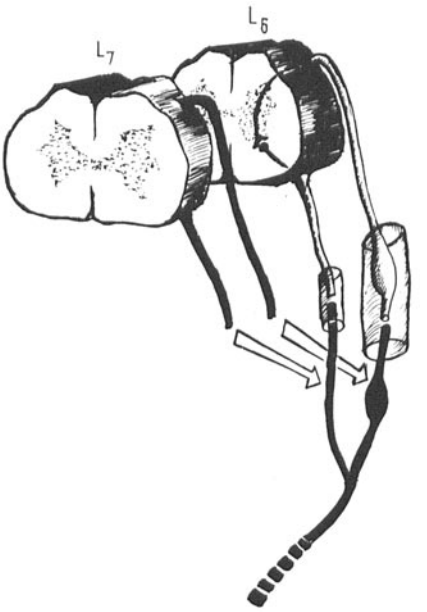

Fig. 2. A heterogeneous dorsal root anastomosis distal to the rostral dorsal ganglion. (The corresponding ventral roots were additionally reconstructed.)

centrifugal direction along the newly-constructed afferent pathway. The surgical procedure involved an additional anastomosis between corresponding ventral roots, the functional success of which has been previously reported (CARLSSON et al.[3], THULIN and CARLSSON[4]). After subsequent time for regeneration, the bioelectrical tests indicated functional restoration of the afferent and efferent pathways and their intersegmental connections.

This model of anastomosing dorsal roots constitutes a technique for by-passing afferent activity to levels proximal to a cauda lesion or a cord transection, which might be of clinical value in selected types of spinal injuries.

Résumé. La régénération des racines postérieures, précédemment sectionées, a lieu exclusivement dans leur parties neurilemmales. Se servant d'une méthode modifiée d'anastomose des racines, leur régénération fonctionelle est démonstrée par des techniques électrophysiologiques.

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Chronic Split Brain Stem Preparation: Effect on the Sleep-Waking Cycle

It has been possible to identify certain structures, important to the maintenance of the normal sleep-waking cycle, owing to observations following complete transections or localized lesions at various levels of the brainstem. However, if the same sections or lesions were executed unilaterally, after a medial sagittal section of the brainstem, it would allow electrophysiological comparison between 'normal' and experimental halves of the brainstem having the same 'milieu intérieur'. For this reason we carried out complete midline longitudinal sections of the brainstem. This report will be concerned only with the findings observed after this section.

Methods. In 25 cats under nembutal narcosis, we opened a 12 mm hole in the skull centered about the occipital crest, and aspirated 2–3 mm of the cerebellum on each side of the midline so that full visualization of the floor of the 4th ventricle was achieved from the opening of the aqueduct of Sylvius to the obex. We inserted a flexible blade edge (20 by 3 mm, attached to a light glass rod) in the midline, guiding its descent straight down until contact was made with the base of the skull, and gently moved it 2 or 3 times in a postero-anterior direction from the P8 (P12) to A5 (A7) levels. Electrodes were implanted bilaterally in both lateral geniculate bodies (LGB), over frontal, parietal and occipital areas of cortex and in posterior neck muscles. A precordial electrode monitored heart rate and respiration. Round-the-clock recordings were made during the entire survival period.