# Paralell pathways in the somatosensory cortex of the (*Dasyprocta prymnolopha*) agouti : Morphometrical analysis of axon terminals projecting from S1 to S2

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Several human studies have shown that the secondary somatosensory area (S2) is a multimodal association area involved in the integration of cutaneous, proprioceptive, and motor afferents necessary to coordination of hand movements during manipulation and object recognition. The morphological complexity of the axon terminal arbor displays sel-similarity and appears similar at many levels of magnification. Recent studies have demonstrated that callosal terminals from the agouti's hindpaw and forepaw representation area in S1 have morphometrical characteristics suggesting the existence of two subgroups: while Type II fragments are more frequent in the forepaw area and have the more complex arborization, Type I fragments make up the highest proportion of hindpaw fragments. However, there are no record of similar, detailed studies dealing with homotopical projections between hierarchically different areas in the same hemisphere. The goal of the present work is to describe quantitatively the morphology of S2 axon terminals originating in the S1 hindpaw area of the agouti. Four animals were anesthetized and had a small amount of Biotinilated Dextran Amine (BDA, 10 kD) injected in target sites identified electrophysiologically. After a survival period, the animals were perfused transcardially and had their brains sectioned tangentially for histological procedures. Each axon fragment was reconstructed using the Neurolucida software (MicroBrightField, Inc.) and a 60x oil-immersion objective. Measurements performed in 31 fragments included: average length of axonal fragments, average surface area, average volume, branch density, bouton density and segment density. Density variables were computed by dividing each value by the total length of the axon fragment. The reconstructed terminals were classified using group analysis (Statistica 6.0). The morphometric analysis of the forepaw terminals in S2 revealed the same groups described by Rocha et al. (2007) for the callosal terminals, called type I and type II, though with different occurrence profiles. Discriminant analysis showed that the area of the axonal field was the main variable responsible for group formation. Quantitative analysis showed that axon terminals projecting from S1 to S2 are morphometrically distinct from terminals connecting homotopical fields in S1 through the corpus callosum. The morphometrical characteristics of ipsilateral terminals observed suggest that somatosensory information is processed through paralell feedforward pathways connecting S1 to S2.

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