

SCANNING ELECTRON MICROSCOPY OF THE MANDIBLE'S BONE  
SURFACE IN *Cebus apella* MONKEY.  
PART II – THE LINGUAL FACE OF THE MENTAL REGION

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**ABSTRACT:** It was noted that areas near the region of alveolar cristae present smooth aspect and vascular foramina with 50 to 100 micrometers in diameter. In region far from the alveolar cristae a thick layer of calcified collagen fibres and small number of vascular foramina were observed. Near the base of the mandible, some osteocyte lacunae and a large layer of bone tissue covered by bundles of calcified collagen fibres were evidenced. We did not observe vascular foramina in this area.

**KEY-WORDS:** Bone surface ; mental region; *Cebus apella*; scanning electron microscope.

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## INTRODUCTION

The surface of normal bone has been described by scanning electron microscope. BOYDE <sup>1</sup>, BOYDE & HOBDELL <sup>2</sup>, MIZUSAKI *et alii* <sup>7,8</sup> reported the normal compacta bone surface, observing the thick bundles of calcified collagen fibres. WATANABE & OKAMOTO <sup>13</sup>, FRASCA *et alii* <sup>4</sup> and COSTA *et alii* <sup>3</sup> studied the alteration resulting from the surgery in monkey's facial bones.

In previous paper, WATANABE *et alii* <sup>14</sup> reported the structure of the buccal aspect of the mandible.

The present paper is performed in order to study, by scanning electron microscope, the lingual face of mandible's bone surface in *Cebus apella* monkey.

## MATERIAL AND METHODS

The segments of three *Cebus apella* monkey mandibles were removed under anaesthesia with sodic Nembutal by intraperitoneal region. Afterwards, the samples were immediately fixed in a modified karnovsky solution containing 2.5% glutaraldehyde, 2% paraformaldehyde in a phosphate buffer in 0.1 M (pH, 7.4) during 12 hours, in 4° C.

The specimens were treated in a 5% Hydrochlorite solution during 5 days, according to the technique described by TAKIGUCHI & KAMIJO <sup>10</sup> and LESTER *et alii* <sup>5</sup>. The samples were sectioned and dehydrated in a graded series of alcohols. Afterwards, the pieces were coated with gold ions in a vacuum evaporator device, Jeol, JEE-SS during 7 minutes and examined in a JSM-P <sub>15</sub>, Jeol, scanning electron microscope.

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## RESULTS

The lingual face of the mental region in the *Cebus apella* monkey presents some interesting characteristics in the compacta bone surface.

Near the alveolar cristae exists a smooth surface composed by a numerous bundles of collagen fibres and vascular foramina with 50 to 100 micrometers in diameter. The alveolar cristae's extremity is round in shape and presents microelevations (Fig. 1). In high magnification, this area presents vascular foramina with 80 micrometers in diameter surrounded peripherically by fibres and osteocyte lacunae (Fig. 2).

In region far from the alveolar cristae, it is observed a surface with thick bundles of collagen fibres in a longitudinal direction and a small number of vascular foramina (Fig. 3).

The region near the mandible's base presents numerous osteocyte lacunae and an irregular layer of calcified collagen fibres. It was also noted the trabeculae of different aspect and no vascular foramina (Fig. 4). In high magnification, it may be clearly evidenced osteocyte lacunae, resorption areas and the irregular surface characterized by bundles of calcified collagen fibres.

## DISCUSSION

Our results show that the lingual face of the mental region on the *Cebus apella* monkey presents a small number of vascular foramina and a smooth surface covered by a thick layer of calcified collagen fibres. Similar observations were also described by BOYDE <sup>1</sup>, BOYDE & HOBDELL <sup>2</sup>, WATANABE <sup>11</sup> and WATANABE *et alii* <sup>14</sup>.

In the alveolar cristae there are microelevations and some vascular foramina with 50 to 100 micrometers in diameter. In adjacent bone surfaces there are many bundles of calcified collagen fibres, which are in agreement to the data reported by WATANABE *et alii* <sup>12</sup> and MIZUSAKI *et alii* <sup>7,8</sup>. On the other hand, we noted in some areas of the mental region that the trabecular bone becomes irregular, contrasting with others where the trabeculae are regular, with normal collagen fibres. Although our data are similar to those described by BOYDE <sup>1</sup> and BOYDE & HOBDELL <sup>2</sup> in the normal surface bone, MARTINS <sup>6</sup> in the condilar process surface of *Cebus apella* monkey, COSTA *et alii* <sup>3</sup> in the structure of the zigomatic bone surface of monkeys and MIZUSAKI *et alii* <sup>7,8</sup> in the alveolar eminence of normal incisor teeth of rats.

Otherwise, our results concerning osteocyte lacunae, observed in the bone surface, present similar morphology to those described by TAKIGUCHI <sup>9</sup>.

## ACKNOWLEDGEMENTS

The authors express their thanks to Professor Nilso Barelli, of Chemical Institute of Araraquara "Campus", UNESP, for permitting the use of the scanning electron microscope.

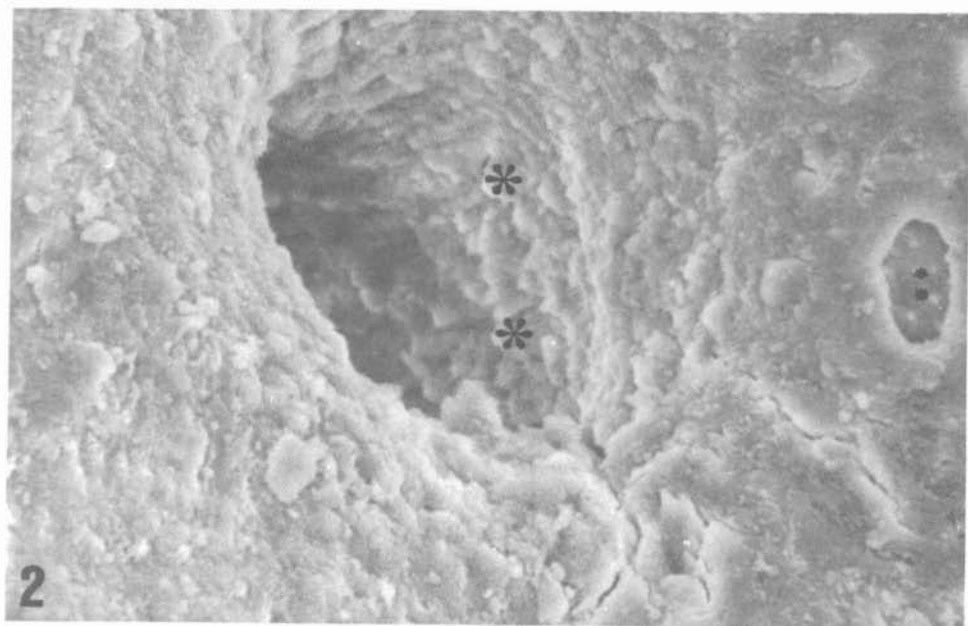
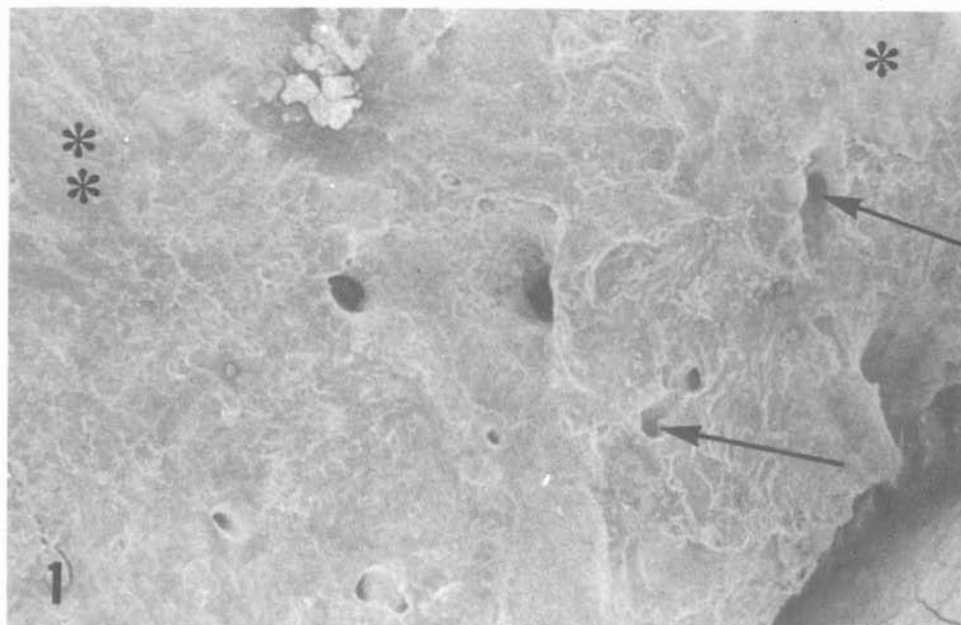


FIG. 1 - Alveolar cristae (\*) with vascular foramina (arrows) and a smooth adjacent surface (\*\*). X 90

FIG. 2 - In high magnification, showing vascular foramen with small irregular protrusion (\*) and osteocyte lacuna (\*\*). X 2400

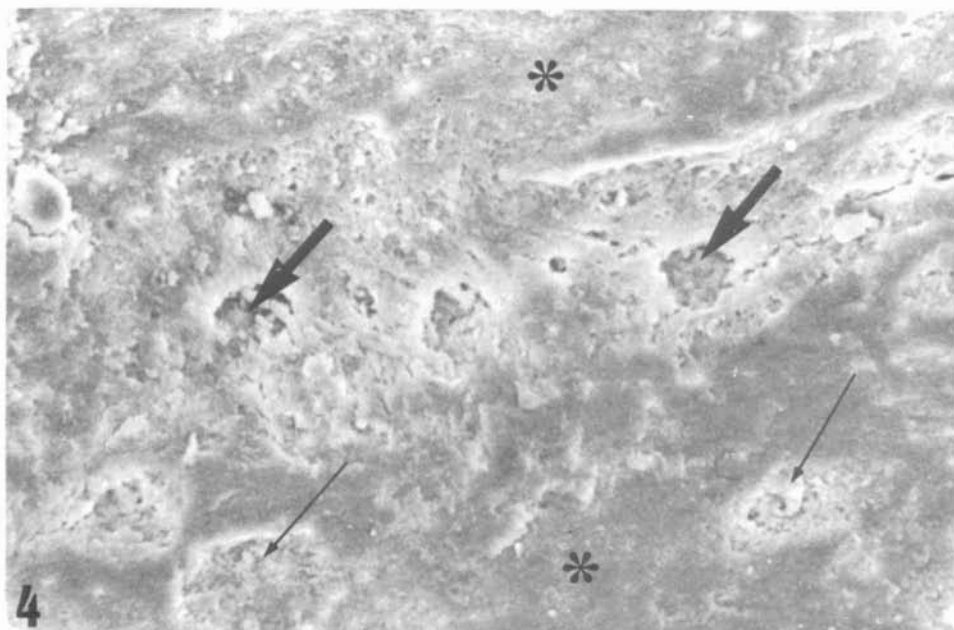
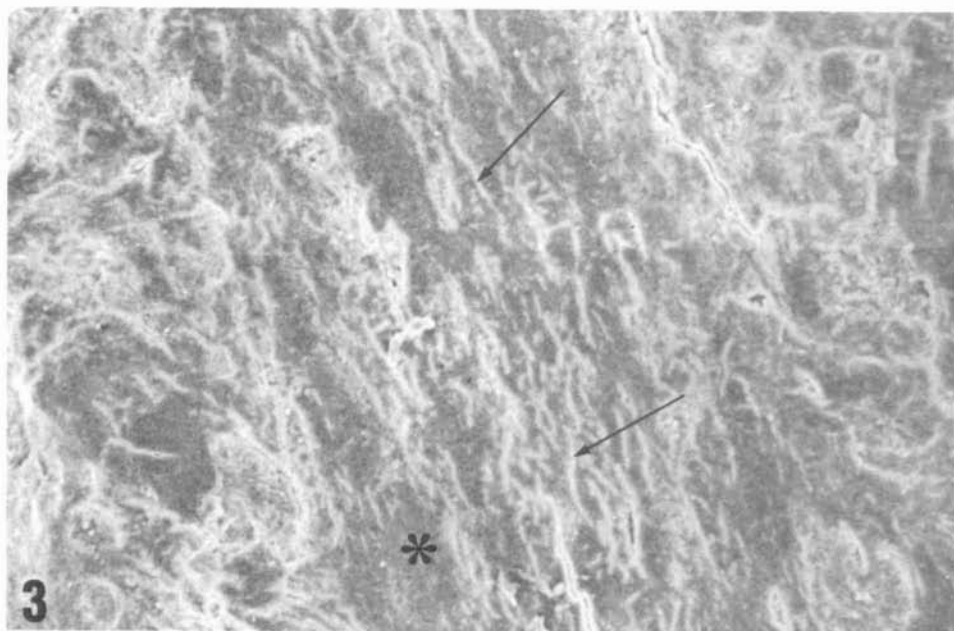


FIG. 3 - The region far from the alveolar cristae, showing the normal surface bone (\*) and a layer of calcified collagen fibres (arrows).  
X 2400

FIG. 4 - Region near the mandible's base showing a compact bone surface (\*), areas of resorption (small arrow) and osteocyte lacunae (large arrow).  
X 1500

WATANABE, I. *et alii* - Estudo, através da microscopia eletrônica de varredura, da superfície óssea mandibular no macaco *Cebus apella* - Parte 2 - Face lingual da região mental. **Rev. Odont. UNESP, São Paulo, 15/16: 99-104, 1986/87.**

**RESUMO:** Características da superfície óssea da face lingual da região mental do macaco *Cebus apella* foram examinadas através da microscopia eletrônica de varredura. Os resultados mostram que áreas próximas à crista alveolar apresentam uma superfície lisa com forames de diâmetros que variam de 50 a 100 micrômetros. Nas regiões logo abaixo da crista alveolar, observou-se uma camada de tecido ósseo compacto revestido por espessos feixes de fibras colágenas calcificadas e poucos forames vasculares. Próximo à base da mandíbula, evidenciou-se algumas lacunas de osteócitos e uma extensa camada de tecido ósseo revestido por feixes de fibras colágenas calcificadas. A ausência de forames vasculares foi constatada.

**UNITERMOS:** Superfície óssea; região mental; *Cebus apella*; microscópio eletrônico de varredura.

#### REFERENCES

1. BOYDE, A. - Scanning electron microscope studies of bone. In: BOURNE, G.H. - *The biochemistry and Physiology of bone*. 2.ed. New York, Academic Press, 1972. vol. 1.
2. BOYDE, A. & HOBDELL, M.H. - Scanning electron microscopy of lamellar bone. *Z. Zellforsch.*, 93: 213-31, 1969.
3. COSTA, J.R.; MADEIRA, M.C.; WATANABE, I. & OLIVEIRA, J.A. - Changes in structure of the facial bone after experimental fracture and displacement of the zygomatic bone in the tufted capuchin (*Cebus apella*) by means of radiography, the split - line, and scanning electron microscope. *Okajimas Folia anat. jap.*, 59: 321-36, 1982.
4. FRASCA, P.; HARPER, R.A. & KATZ, J.L. - Scanning electron microscope studies of collagen, mineral and ground substance in human cortical bone. *Scanning electron microscopy*, 3: 339-46, 1981.
5. LESTER, K.S.; ASH, M. Jr. & LILLIE, J.H. - Condylar cartilage: A scanning electron microscope study of anorganic mammalian condyles. *J. prosth. Dent.*, 45: 422-1981.
6. MARTINS, A.A. - *Influência da condilectomia unilateral da mandíbula, sobre a forma e arquitetura do crânio e dos músculos da mastigação do macaco Cebus apella*. São Paulo, Instituto Ciên. Bioméd. U.S.P., 1982. (Tese - Doutorado).
7. MIZUSAKI, C.I.; WATANABE, I. & SEMPRINI, M. - Estudo, através da microscopia eletrônica de varredura, da compacta óssea vestibular normal no alvéolo de incisivos de ratos. *Vida odont.*, 20: 3-12, 1985.
8. MIZUSAKI, C.I.; WATANABE, I. & SEMPRINI, M. - Changes in the alveolar vestibular bone compacta following extraction of an incisor in rats. Scanning electron microscopy study. *Rev. bras. Ciên. morf.*, 2: 16-23, 1985.
9. TAKIGUCHI, R. - Scanning electron microscopy of the alveolar ridge of the edentulous mandible. *Bull. Tokyo dent. Coll.*, 18: 129-38, 1977.
10. TAKIGUCHI, R. & KAMIJO, Y. - Scanning electron microscopical study on morphological changes in surfaces of the mandibular joint because of resorption. *Bull. Tokyo dent. Coll.*, 16: 163-75, 1975.
11. WATANABE, I. - Estudo da superfície óssea lingual do processo alveolar superior e inferior. Observações ao microscópio eletrônico de varredura. *Rev. paul. Odont.*, 4: 2-10, 1983.

12. WATANABE, I.; COSTA, J.R.; MADEIRA, M.C. & OLIVEIRA, J.A. - Estudo da sutura zigomático-temporal normal e modificada após fratura e deslocamento do osso zigomático no macaco-prego (*Cebus apella*), através da microscopia eletrônica de varredura. *Naturalia*, 7: 99-105, 1982.
13. WATANABE, I. & OKAMOTO, T. - Aspectos ultra-estruturais do calo ósseo após a remoção cirúrgica do arco zigomático. Estudo ao microscópio eletrônico de transmissão e varredura. *Rev. A.P.C.D. reg. Araçatuba*, 2: 11-27, 1981.
14. WATANABE, I.; ZERLOTTI, R.F. & AZEREDO, R.A. - Estudo através da microscopia eletrônica de varredura, da superfície óssea da mandíbula do macaco *Cebus apella*. Parte I - Face vestibular da região mental. *Arq. Cent. Est. Cur. Odont. U.F.M.G.*, 1985. (em publicação).

Recebido para publicação em 22.11.85