

Nonsurgical therapy of mucosal and cutaneous fistulae

Author_Arnaldo Castellucci, Italy

Once the pulp tissue has become necrotic, the products of cellular degeneration, bacterial toxins, and occasionally the bacteria themselves within the canal spread through the apical foramen or the various lateral foramina into the surrounding periradicular tissue.



Fig. 1a Preoperative radiograph of the upper left central incisor with a necrotic pulp caused by preceding trauma.

A slow inflammatory process thus begins in the tissue contained within the periodontal ligament. Left to itself, it may manifest in a variety of ways ranging from simple widening or thickening of the ligament to granuloma or cyst.

The increased space of the periodontal ligament in this area is due to resorption of the surrounding bony trabeculae with secondary fusion of the connective tissue of the periodontal ligament with the intertrabecular connective tissue of the medullary spaces. The fibers of the periodontal ligament, which become disordered and dysfunctional, lose their insertions in the surrounding bone. However, their insertions in the cementum, particularly in the periphery of the lesion, are preserved. The pathological entity commonly known as a *granuloma* develops in this way. Sometimes, the inflammatory process also involves other cellular elements within the periodontal ligament, namely epithelial rests of Malassez, which, when stimulated to proliferate, give rise to a cavity and a radicular cyst.²⁵

In its various clinical manifestations, chronic apical periodontitis is generally asymptomatic. It is usually discovered on routine radiographic checkups, which on occasion is prompted by suspicious discoloration of the dental crown. The patient may relate a history of acute (pulpitic) pain that spontaneously resolved or a history of trauma, but he may also present with a completely unrevealing history. Sometimes, a fistula may be present, through which the patient reports having noticed an intermittent discharge of pus (Figs. 1a–f).



Fig. 1b The dental crown is strongly discolored by hemorrhage secondary to the trauma. Note the mucosal fistula.

Fig. 1c One week following the cleaning and shaping procedure only, the fistula has completely disappeared.

The fistula provides a means of continuous drainage of the lesion. This usually prevents reactivations, either spontaneous or consequent to intervention.

Some authors^{2,6,10,12,22} are still convinced that the presence of a fistula indicates a more serious lesion that requires special intervention, such as surgical incision and excision of the entire fistulous tract, in addition to extraction of the diseased tooth (Fig. 2).

In fact, the presence of a fistula should be seen as a favorable sign, since it is associated with a number of advantages, so much so that some authors^{3,8,15,23,24,26,31,32} suggest that if there is none, one should be created.

It may be extremely helpful in diagnosis. Opacification of the fistulous tract by the insertion of a gutta-percha cone clearly demonstrates the diseased tooth 16 (Figs. 3a–d). The opening of the fistula may be found on the mucosa overlying the tooth that sustains it, but it may also often be found at a considerable distance from the diseased tooth (Figs. 4a–f). Indeed, it may cross the midline, as in cases described by Feiglin⁹ and Kaufmann.¹⁶

In other situations, the fistula may run in the space of the periodontal ligament of the same tooth (Fig. 5). It may even traverse the periodontal ligament of the adjacent healthy tooth,¹⁷ thus simulating a lesion of periodontal origin (Figs. 6a–d). In such cases, negative pulp tests performed on the crown of the tooth indicated by the gutta-percha cone inserted into the fistula assist in making the correct diagnosis.

Furthermore, healing of the lesion about one week after cleaning and shaping of the infected root canals without the use of any medications within the canal (Figs. 7a–c) confirms that the diagnosis was correct and testifies to the efficacy of the treatment. This also suggests a favorable prognosis for the lesion.



Fig. 1d Postoperative radiograph: the filling has been performed after determining clinically that the fistula had healed



Fig. 1e Appearance of the dental crown after bleaching.

Fig. 1f One year recall.



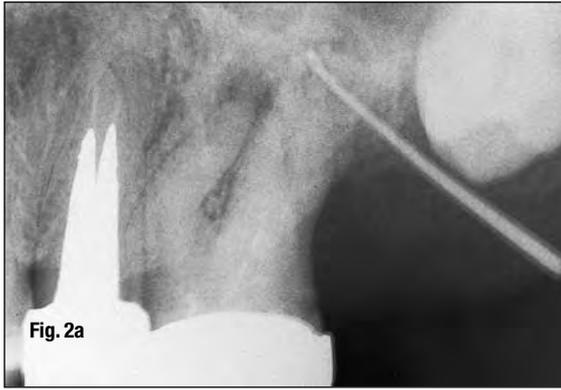


Fig. 2a



Fig. 2b

Fig. 2a The endodontic treatment of the upper left first molar is completely inadequate. A gutta-percha cone is tracing a sinus tract, originating on the palate, in the area of the missing second molar. The patient already received a pantomograph.

Fig. 2b A computerized tomography.

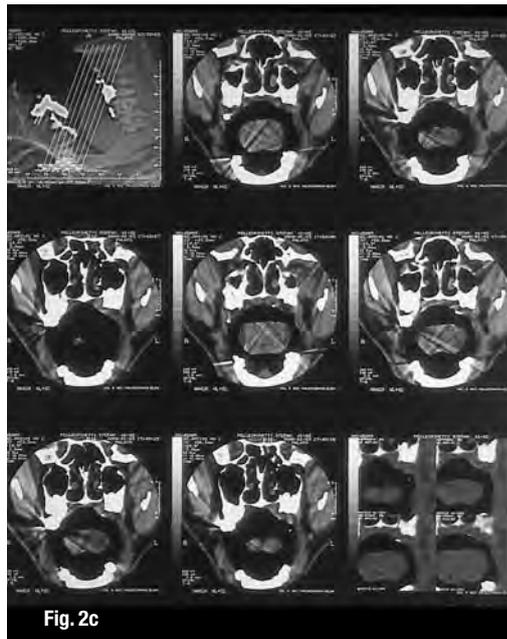


Fig. 2c

Fig. 2c A biopsy (lperkeratosis and acute inflammation!)

Fig. 2d The prescription for tooth extraction ...

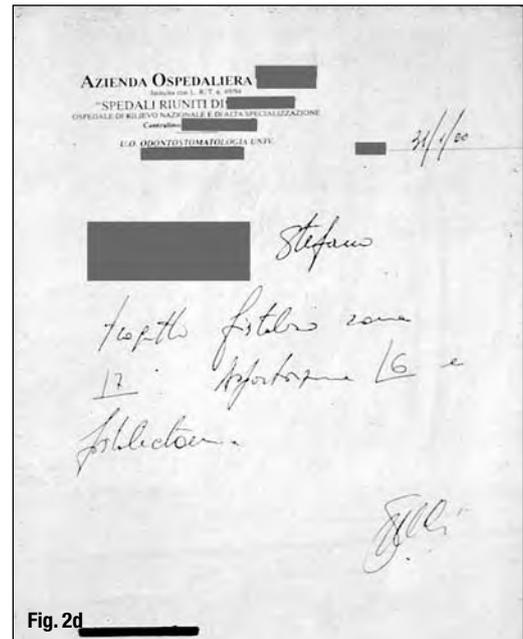


Fig. 2d



Fig. 2e

Fig. 2e ... and the fistulectomy!



Fig. 2f

Fig. 2f After the removal of the old restoration, it is evident the way the access cavity was previously made: The pulp horns have been misdiagnosed for canal orifices and the clinician forgot to remove a big portion of the roof of the pulp chamber.

Finally, as already suggested, the fistula provides a means of continuous drainage of the suppurative contents of the periapical lesion. This discourages sudden reactivations, either spontaneous or as a result of our intervention.

If the drainage is not continuous, but rather intermittent, it is preceded by slight swelling of the area as a result of the increased pressure of pus behind the closed orifice. When this pressure is great enough to rupture the thin wall of soft tissue, the suppurative material issues externally through the small opening of the fistulous orifice.¹¹ This orifice may heal and re-close, only to reopen later. The discharge of pus is never accompanied by intense pain. At most, the patient will complain of slight soreness in that area prior to reopening of the external orifice.

The pus creates a tract in the surrounding tissues, following the *loci minoris resistentiae*. It may exit at any point of the oral mucosa or even the skin.¹⁹ It is not uncommon, particularly in young patients, to find cutaneous fistulae at the level of the mental symphysis, if lower incisors are involved (Figs. 8a-e), or in the submandibular region, if a lower first molar is involved (Figs. 9a-e), or in the floor of the nasal fossa,

Ad tk

Fig. 2g_Postoperative radiograph.



Fig. 2h_The fistula is healed.



Fig. 2i_Six-month recall.



if a central incisor is involved.^{13,30}

Cutaneous fistulae, which unfortunately are sometimes treated as though they were independent dermatologic lesions, have the same pathogenic and prognostic significance as mucosal fistulae and require the same therapy.^{21,33} A review of the literature^{5,7,18,29} reveals that patients with cutaneous fistulae are sometimes subjected to repeated surgical excisions and biopsies (Fig. 2d) before it is clear that the fistula is none other than an extension of pulp disease in the periradicular tissues.

Trying to treat such lesions with a circular incision of the orifice of the cutaneous fistula and excision of its entire tract, with all the ramifications – par-

ticularly esthetic – of such an intervention, is not consistent with the present standard of care and can be considered pure folly.

These fistulae simply require identification of the diseased tooth, whose root canal system must be cleaned and shaped.

If the tooth presents any obstacles to nonsurgical treatment or retreatment, or if the patient specifically requests surgery, one may proceed surgically, but one's attention must be directed solely to achieving a retrograde apical seal, and not eliminating the fistulous tract or its cutaneous orifice (Figs. 8a–e). The reason why some authors believe in the need for surgical removal of the fistulous tract lies in the

Fig. 3a_Preoperative radiograph of the upper right first and second molars. Note the round radiolucency between the mesiobuccal root of the second molar and the distobuccal root of the first. The patient had presented with a vestibular fistula at the level of the first molar, and for financial reasons only wanted to retreat the diseased tooth.



Fig. 3b_A gutta-percha cone placed in the fistula indicates that the fistulous tract arises from the second molar.



Fig. 3c_Postoperative radiograph of the second molar. Note that a small lateral canal in the mesiobuccal root, which was apparently responsible for the lesion seen in the preoperative film, has filled up.



Fig. 3d_Five-year recall.



Ad tk

Fig. 4a This young patient presented with a fistula between the canine and lower right first premolar. A gutta-percha cone has been inserted into the fistulous tract.



Fig. 4a

Fig. 4b Radiographically, the gutta-percha cone seems to implicate the lateral incisor as the diseased tooth. All the teeth heretofore identified have responded positively to the vitality tests.



Fig. 4b

Fig. 4c Deeper insertion of the gutta-percha cone finally identifies the two lower central incisors as the diseased teeth. Both respond negatively to the various vitality tests.



Fig. 4c



Fig. 4d

Fig. 4d One week after cleaning and shaping, the fistula has closed.

Fig. 4e Postoperative radiograph.

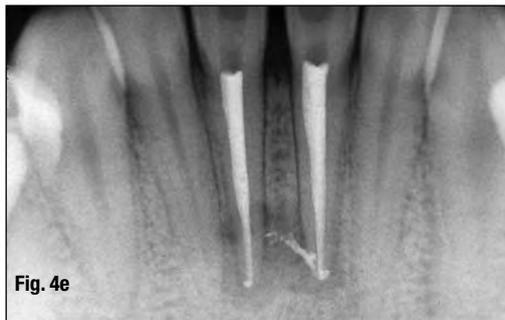


Fig. 4e

Fig. 4f Two-year recall.

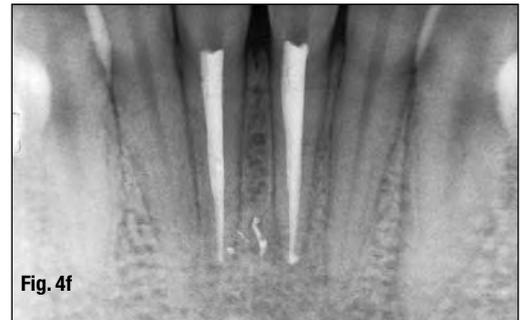


Fig. 4f

Fig. 5 Preoperative radiograph of a necrotic lower left second premolar with a fistula opening into the space of the periodontal ligament. A gutta-percha cone has been inserted into the fistula.



Fig. 5

Fig. 6a The periodontal probe disappears in the sulcus of the canine in a patient with good oral hygiene and healthy periodontium in the different quadrants. The canine responds positively to the tests of vitality, while the lateral incisor is necrotic.



Fig. 6a

Fig. 6b Preoperative radiograph of the lateral incisor. Note that the lesion "rests" on the mesial side of the root of the adjacent canine.



Fig. 6b

mistaken conviction that it is lined by an epithelium.²⁸ Grossman¹¹ states, however, that such tracts are lined by granulation tissue: in his study, he was unable to identify any epithelium at all.



Fig. 6c



Fig. 6d

Figs. 6c_Clinical appearance of the canine gingiva one week after cleaning and shaping of the lateral incisor.

Figs. 6d_Postoperative radiograph.

Bender and Seltzer⁴ have also made histologic studies of numerous fistulous tracts without finding an epithelial lining.

Other authors^{1,14,31} agree that the fistulous tract may be lined by flat, multilayered epithelial cells, but that more often it is lined by granulation tissue, with acute and chronic inflammatory cells.

Given the current state of knowledge, there is no reason to recommend surgical removal of such tracts. There is no reason that even epithelium-lined fistulous tracts should not heal after appropriate endodontic therapy.

When it is present, the epithelium may arise from the oral mucosa or proliferating epithelial cells from the periapical lesion. However, there is no correlation between the presence or absence of an epithelium and the clinical appearance of the fistula or its chronicity.

In animal experiments, Ordman and Gillman²⁰ have demonstrated that cutaneous sutures may become completely epithelialized if the sutures are left in place for several weeks. Once they are removed, however, the epithelium-lined tract always heals completely.

There is no reason that the same should not happen to the possibly present epithelium of the fistula of a necrotic tooth once the inflammatory stimulus is removed.

Obviously, these fistulae must be distinguished from congenital fistulae of the neck, both lateral (arising from the second branchial cleft) and medial



Fig. 7b

Figs. 7a_Fistula corresponding to the upper left central incisor.



Fig. 7a



Fig. 7c

Figs. 7b_Healing of the fistula one week later. The canal has been cleaned, shaped, and irrigated with sodium hypochlorite, while the pulp chamber has been medicated with Cresatin and Cavit. In other words, it has been treated as though the fistula did not exist. Its resolution confirms that the diagnosis and therapy were correct and justifies proceeding with three-dimensional filling of this root canal system.

Figs. 7c_Another view one year later.



Fig. 8a_Cutaneous fistula in the mental region.



Fig. 8b_Preoperative radiograph of the lower incisors. The patient elected surgical therapy for economical reasons. The left lateral incisor had already been subjected to a cavity test.

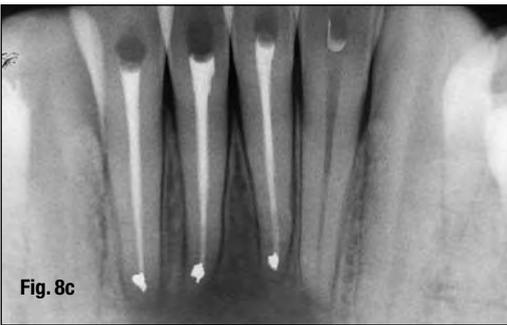


Fig. 8c_Postoperative radiograph. Three apicoectomies with amalgam retrofilling have been performed. Not the least attention has been paid to removal of all the granulation tissue or to curettage of the surrounding bone or apices, or to removal of the fistulous tract, or even to circular incision of the cutaneous orifice of the fistula.



Fig. 8d_Complete healing of the cutaneous fistula without any residual scarring after two years.

Fig. 8e_Radiograph two years later confirms total resolution of the previous radiolucency.

(arising from rests of the thyroglossal duct), which are lined by an epithelium. Such fistulae, however, have a different pathogenesis and obviously do not resolve spontaneously, but only after careful surgical excision of the entire tract.²⁷ The differential diagnosis includes the following:^{13,21}

- localized infections of the skin, such as pyoderma, pimples, ingrown hairs, and obstructed sweat glands.
- traumatic or iatrogenic lesions.
- osteomyelitis.
- neoplasia.
- tuberculosis.
- actinomycosis.

Conclusion

Endodontic lesions with a fistulous tract should always be welcome in our office. And this is true for many reasons:

- The tooth responsible is necrotic, therefore the patient does not need any anesthesia, which means that while we make the access cavity, at the same time we perform the most important and the most reliable vitality test, the cavity test.
- The insertion of a gutta-percha cone in the fistulous tract will help in the diagnosis: the radiograph will immediately show the tooth responsible.
- The patient will never have a flare up. The recrudescence after treatment or retreatment is nothing more than one little drop of pus coming out from the fistula, and the patient is not even aware of it.
- One week after cleaning and shaping of the root canal system, the fistula is gone, and this will confirm that we made the right diagnosis and the right treatment.

The presence of a fistula, in conclusion, is not an indication for extraction, is not an indication for surgery, is not an indication for any specific medication: it is just an indication for a correct root canal treatment.

References:

1. Baumgartner, J.C., Picket, A.B., Muller, J.T.: Microscopic examination of oral sinus tracts and their associated periapical lesions.



- J. Endod. 10:146, 1984.
2. Bella, G., Russo, S., Messina, G., Badalà, A.: Considerazioni sulle fistole cutanee odontogene. *Il dentista moderno*, 10:2353, 1989.
 3. Bence, R.: Trephination technique. *J. Endod.* 6:657, 1980.
 4. Bender, I.B., Seltzer, S.: The oral fistula: its diagnosis and treatment. *Oral Surg.* 14:1367, 1961.
 5. Braun, R.J., Lehman, J.: A dermatologic lesion resulting from a mandibular molar with periradicular pathosis. *Oral Surg.* 52:210, 1981.
 6. Calvarano, G., De Paolis, F., Bernardini, G.: Fistole cutanee e salivari: soluzioni terapeutiche. *Odontostomatologia e Implantoprotesi*, 1:82, 1991.
 7. Cioffi, G.A., Terezhalmay, G.T., Parlette, H.L.: Cutaneous draining sinus tract: an odontogenic etiology. *J. Am. Acad. Dermatol.* 14:94, 1986.
 8. Elliot, J.A., Holcomb, J.B.: Evaluation of a minimally traumatic alveolar trephination procedure to avoid pain. *J. Endod.* 14:405, 1988.
 9. Feiglin, B.: Pain and fistulas can cross the midline. *J. Endod.* 11:132, 1985.
 10. Galli, S., Galli, G.: Considerazioni anatomiche e cliniche su un caso di fistola odontogena. *Odontostomatologia e Implantoprotesi*, 6:50, 1989.
 11. Grossman, L.I., Oliet, S., Del Rio, C.E.: *Endodontic practice*. 11th ed. Lea & Febiger, Philadelphia, 1988.
 12. Harnisch, H.: *Apicectomia. Scienza e Tecnica Dentistica. Edizioni Internazionali. Milano*, 1981.
 13. Helling, I., Rotstein, I.: A persistent oronasal sinus tract of endodontic origin. *J. Endod.*, 15:132, 1989.
 14. Ingle, J.I.: *Endodontics*, Lea & Febiger, Philadelphia, 1965, pp. 361-362,441.
 15. Ingle, J.I.: *Endodontics*, 3rd ed. Lea & Febiger, Philadelphia, 1985.
 16. Kaufman, A.Y.: An enigmatic sinus tract origin. *Endod. Dent. Traumatol.* 5:159, 1989.
 17. Kelly, W.H., Ellinger, R.F.: Pulpal-periradicular pathosis causing sinus tract formation through the periodontal ligament of adjacent teeth. *J. Endod.* 14:251, 1988.
 18. Lewin-Epstein, J., Taicher, S., Azaz, B.: Cutaneous sinus tract of dental origin. *Arch. Dermatol.* 114:1158, 1978.
 19. Mcwalter, G.M., ALEXANDER, J.B., DEL RIO, C.E., KNOTT, J.W.: Cutaneous sinus tracts of dental etiology. *Oral Surg.* 66:608, 1988.
 20. Ordman, L.J., Gillman, T.: Studies in the healing of cutaneous wounds. II. The healing of epidermal, appendageal and dermal injuries inflicted by suture needles in the skin of pigs. *Arch. Surg.* 93:883, 1966.
 21. Pagavino, G., Pace, R., Giachetti, L.: Le fistole cutanee odontogene: diagnosi e terapia. *R.I.S.*, Anno LIX, 11/12:6, 1990.
 22. Palattella, G., Mangani, F., Palattella, P., Palattella, D., Mauro, R.: Fistole cutanee da estrinsezioni perimandibolari di parodontiti apicali croniche. *Dental Cadmos* 2:57, 1987.
 23. Peters, D.D.: Evaluation of prophylactic alveolar trephination to avoid pain. *J. Endod.* 6:518, 1980.
 24. Sargenti, A.: Apical aeration made easy by a new instrument. *J. Br. Endod. Soc.* 6:49, 1972.
 25. Schilder, H.: *Endodontic therapy*, in: *Current therapy in Dentistry*. Goldman et Al. eds., vol. 1, St. Louis, The C.V. Mosby Company, 1964, pp. 84-102.
 26. Seldon, H.S., Parris, L.: Management of endodontic emergencies. *J. Dent. Child.* 37:260, 1970.
 27. Sicher, H.: *Orban's Oral Histology and Embriology*, ed. 6, St. Louis, The C.V. Mosby Company, 1966, pp. 1-17.
 28. Sommer, R.F., Ostrander, F.D., Crowley, M.C.: *Clinical Endodontics*, 3rd ed., W.B. Saunders Company, Philadelphia, 1966, p. 306.
 29. Spear, K.L., Sheridan, P.J., Perry, H.O.: Sinus tracts to the chin and jaws of dental origin. *J. Am. Acad. Dermatol.* 8:486, 1983.
 30. Strader, R.J., Seda, H.J.: Periapical abscess with intranasal fistula. *Oral Surg.* 32:881, 1971.
 31. Weine, F.S.: *Endodontic therapy*, 2nd ed., The C.V. Mosby Company, St. Louis, 1976.
 32. Wolch, I.: A new approach to the basic principles of endodontics. *Int. Dent. J.* 25:179, 1975.
 33. Zerman, N., Urbani, G., Menegazzi, G., Cavalleri, G.: Il trattamento di fistole cutanee da lesioni endodontiche. *Il Dentista Moderno* 7:1381, 1990.



Fig. 9a

Figs. 9a Cutaneous fistula in the right submandibular region.



Fig. 9b

Figs. 9b Preoperative radiograph of the ipsilateral lower first molar. The tooth had been "opened" one month before and left open "to drain." Note the small radiopacity at the center of the access cavity, due to a residuum of the chamber roof left in place.



Fig. 9c

Figs. 9c Clinical appearance of the access cavity: three openings have been made in the roof of the pulp chamber! One, corresponding to the distal canal, is shaped like a figure 8. The two round ones correspond to the mesial canals: The pulp horns have been misdiagnosed for canal orifices.



Fig. 9d

Figs. 9d Postoperative radiograph. The tooth has been pretreated with a cooper band.



Fig. 9e

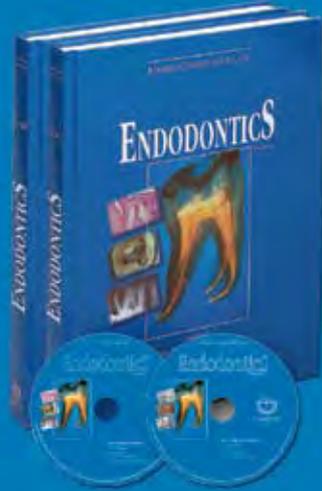
Figs. 9e Healing of the fistulous tract two years later. Note the complete absence of any scarring.

_About the author

roots

**Dr. Arnaldo Castellucci**

Dr. Castellucci graduated in medicine at the University of Florence in 1973 and specialized in dentistry at the same University in 1977. From 1978 to 1980 he attended continuing education courses in endodontics at Boston University School of Graduate dentistry with Prof. Herbert Schilder. As well as running a practice limited to endodontics in Florence, Italy, Castellucci is past president of the Italian Endodontic Society, past president of the International Federation of Endodontic Associations, an active member of the European Society of Endodontology, an active member of the American Association of Endodontists, and a visiting professor of endodontics at the University of Florence Dental School. He is editor of The Italian Journal of Endodontics and of The Endodontic Informer, founder and president of The Warm Gutta Percha Study Club and The Micro-Endodontic Training Center, and he is international editor of Endo Tribune. An international lecturer, he is the author of the text "Endodontics," which is now available in English.



This article is an excerpt from Dr. Arnaldo Castellucci's textbook "Endodontics," which is divided into three volumes and 35 chapters. Volumes 1 and 2 of this endodontic textbook are now available for the first time in English, completely revised with new chapters and many more color illustrations. Each volume comes complete with its own CD-ROM, which includes the complete text and illustrations in PDF files. To order, contact Il Tridente S.R.L., Viale dei Mille 60, 50131 Firenze, Italy, Tel. +39 055 500 1312, Fax +39 055 500 0232, info@iltridente.it, or visit www.iltridente.it.