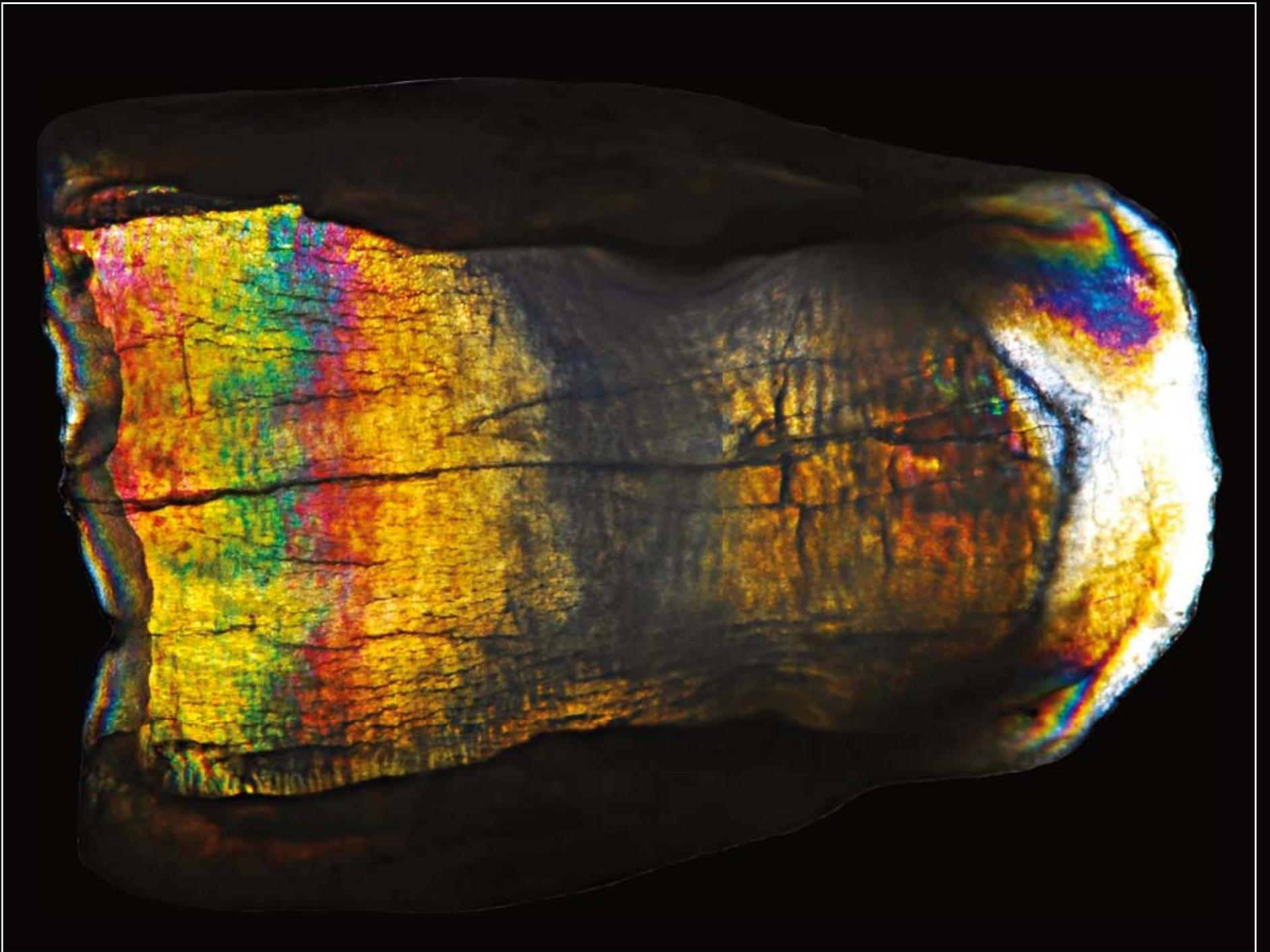






inspiration

people, teeth, and restorations





inspiration

people, teeth, and restorations

authors

Luiz Narciso Baratieri

Sylvio Monteiro Jr, Paulo Kano, Cláudio Pinho, Francis Cunha Lima,

Daniel Edelhoff, Fabio Andretti, Jackeline Coutinho Guimarães,

Juliana Nunes Rolla, Júnio Santos Almeida e Silva, Jussara Karina Bernardon,

Kazuza Bueno Ferreira da Rocha, Leandro Augusto Hilgert,

Letícia Brandão Durand, Luis Henrique Schlichting, Maurício Watanabe,

Renan Belli, Renata Gondo, Wilmar Porfírio

 **QUINTESSENCE PUBLISHING**

London, Berlin, Chicago, Tokyo, Barcelona, Beijing, Istanbul, Milan, Moscow,
New Delhi, Paris, Prague, São Paulo, Seoul, Singapore and Warsaw



British Library Cataloguing in Publication Data

Baratieri, Luiz Narciso.

Inspiration : people, teeth, and restorations.

1. Dental materials. 2. Dental enamel--Spectra.

3. Dentin--Spectra. 4. Fillings (Dentistry)

I. Title

617.6'75-dc23

ISBN-13: 9781850972297

Title: Inspiration – people, teeth, and restorations

Authors: Luiz Narciso Baratieri

Sylvio Monteiro Jr, Paulo Kano, Cláudio Pinho, Francis Cunha Lima, Daniel Edelhoff, Fabio Andretti, Jackeline Coutinho Guimarães, Juliana Nunes Rolla, Júnio Santos Almeida e Silva, Jussara Karina Bernardon, Kazuzu Bueno Ferreira da Rocha, Leandro Augusto Hilgert, Letícia Brandão Durand, Luis Henrique Schlichting, Maurício Watanabe, Renan Belli, Renata Gondo, Wilmar Porfírio

Graphic Designer: Emmanuel Fontes

Copyright © 2012 by Quintessence Publishing Co. Ltd

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher.

 **QUINTESSENCE PUBLISHING**

Quintessence Publishing Co. Ltd,
Grafton Road, New Malden, Surrey KT3 3AB,
United Kingdom
www.quintpub.co.uk



authors

Luiz Narciso Baratieri

Certificate in Periodontics; MS and PhD in Operative Dentistry, University of Bauru, SP, Brazil; Postdoctoral Degree in Operative Dentistry, University of Sheffield, UK; Professor, Head, and Chair of the Department of Operative Dentistry and Coordinator of the Graduate Program in Operative Dentistry, School of Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Sylvio Monteiro Jr

MS in Pediatric Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; MSD in Operative Dentistry and PhD in Preventive Dentistry, Indiana University, Indianapolis, Indiana, USA; Professor, Operative Dentistry, School of Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Paulo Kano

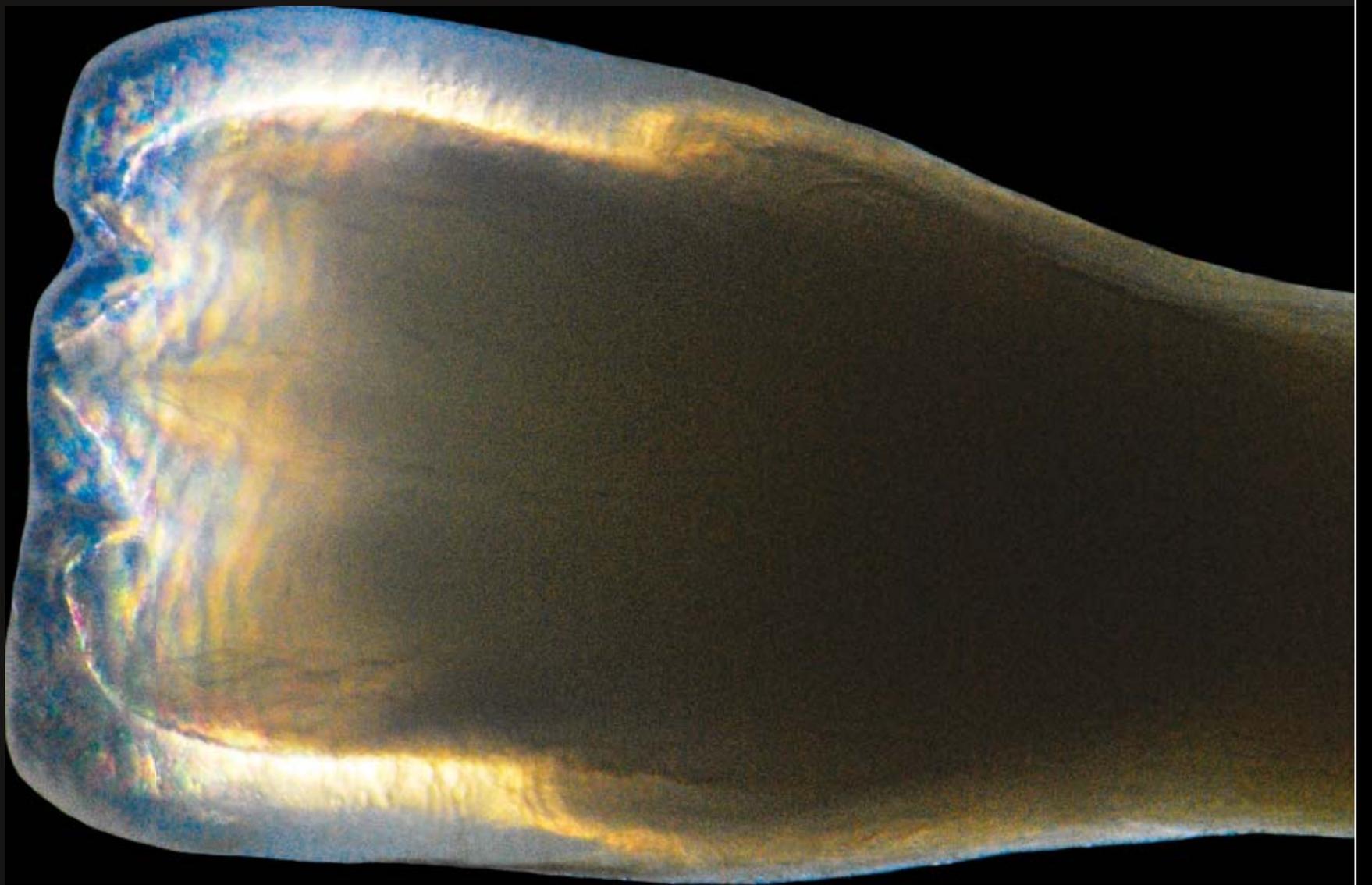
Professor of the Certification and Graduate Program in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Cláudio Pinho

Certificate in Operative Dentistry, Universidade Estadual Paulista (UNESP), Araraquara, São Paulo, Brazil; Vice President of the Brazilian Society of Esthetic Dentistry

Francis Cunha Lima

Certificate in Operative Dentistry, Private Practice, Goiânia, Brazil





authors

Daniel Edelhoff

Professor, Department of Prosthodontics, Ludwig-Maximilians University, Munich, Germany

Fabio Andretti

MS in Dental Materials and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Jackeline Coutinho Guimarães

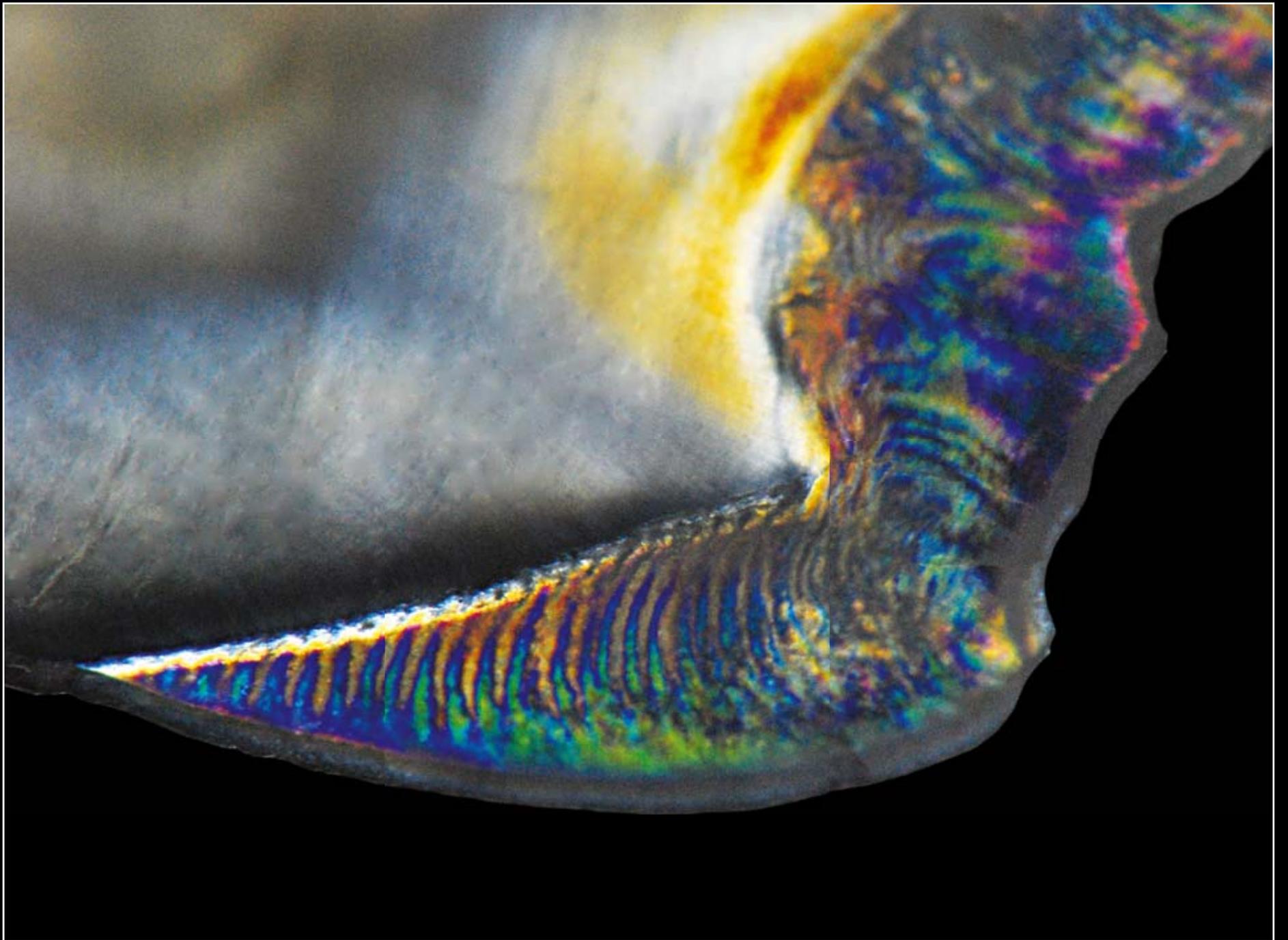
MS in Prosthodontics, Federal University of Espírito Santo, Vitória, Brazil; PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, Federal University of Espírito Santo, Vitória, Brazil

Juliana Nunes Rolla

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Júnio Santos Almeida e Silva

MS and PhD student in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil





authors

Jussara Karina Bernardon

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Kazuza Bueno Ferreira da Rocha

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, Brazil; Professor, Department of Operative Dentistry, University of Maringá, Maringá, Brazil

Leandro Augusto Hilgert

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, University of Brasília, Brasília, Brazil

Letícia Brandão Durand

MS in Operative Dentistry, Universidade Estadual Paulista (UNESP), Araraquara, Brazil; PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, Federal University of Santa Maria, Santa Maria, Brazil

Luis Henrique Schlichting

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil





authors

Maurício **Watanabe**

Certificate in Operative Dentistry, Private Practice, Araçatuba, SP, Brazil

Renan **Belli**

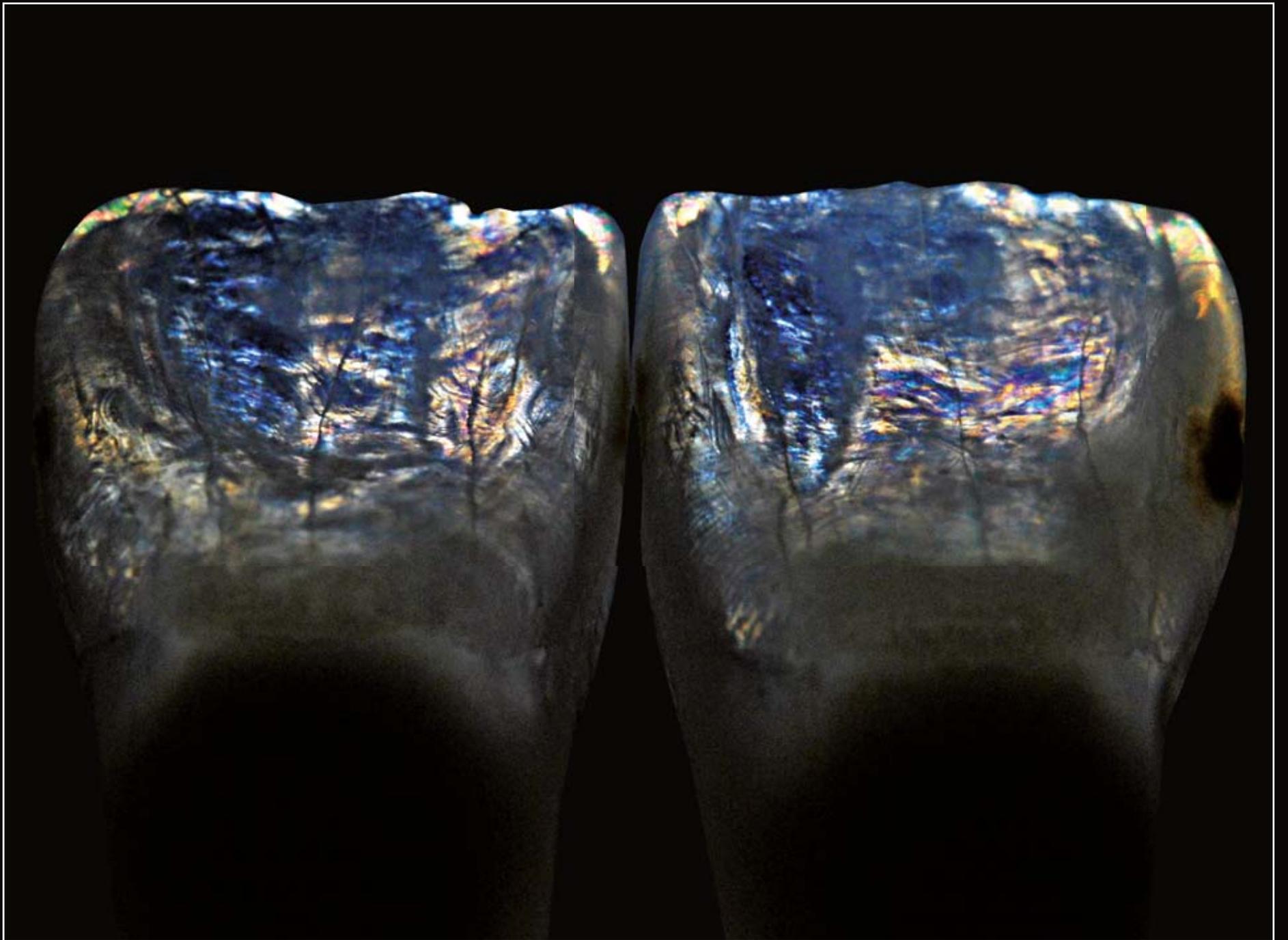
MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Renata **Gondo**

MS and PhD in Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil; Professor, Department of Operative Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Wilmar **Porfírio**

Dental Technician, Goiânia, Brazil





preface

Luiz Narciso Baratieri

For the last 10 years, apart from working hard as a dentist and as a professor, I have had the privilege to assess and photograph thousands of slices of natural teeth under different lighting conditions, in different thicknesses, and in different media. I have also assessed and photographed extracted anterior and posterior teeth before and after slicing them. I have evaluated and photographed tooth slices from young, adult, and elderly people. I have evaluated and photographed sound and decayed teeth, teeth with noncarious cervical lesions, and teeth restored with different types of materials. Countless times I have evaluated and photographed only the enamel of natural teeth with different media, lighting conditions, and observation angles. I have had the opportunity to evaluate and photograph nearly every kind of tooth in the 25 years I have spent evaluating and photographing natural teeth from patients in my daily practice and the teeth of many of my students and thousands of patients at the university where I teach. In addition to teeth, I have photographed many of my patients and countless restorations.

I have done all of this just about every day. I have done it many times a day. I have done it in between appointments. I have done it with a passion I have never felt for anything else in dentistry, a passion

inspired especially by the curiosity that people, teeth, and restorations have always made me feel. As I photograph, I become increasingly fascinated with the people and the optical behavior of their teeth, the slices, and the hard tissues (I already knew Claude Sieber's fantastic books). The translucency of dentin in certain regions had me fascinated. The optical behavior of the dentinoenamel junction also fascinated me. What can you say about enamel? So many colors! In fact, colors fascinated me for many years before I understood their basic principles. Despite the fascination, I was always careful not to let it drive me away from my main focus or to turn me into a blind man that sees all, but perceives nothing, especially when provoked by the beautiful images seen through light polarization.

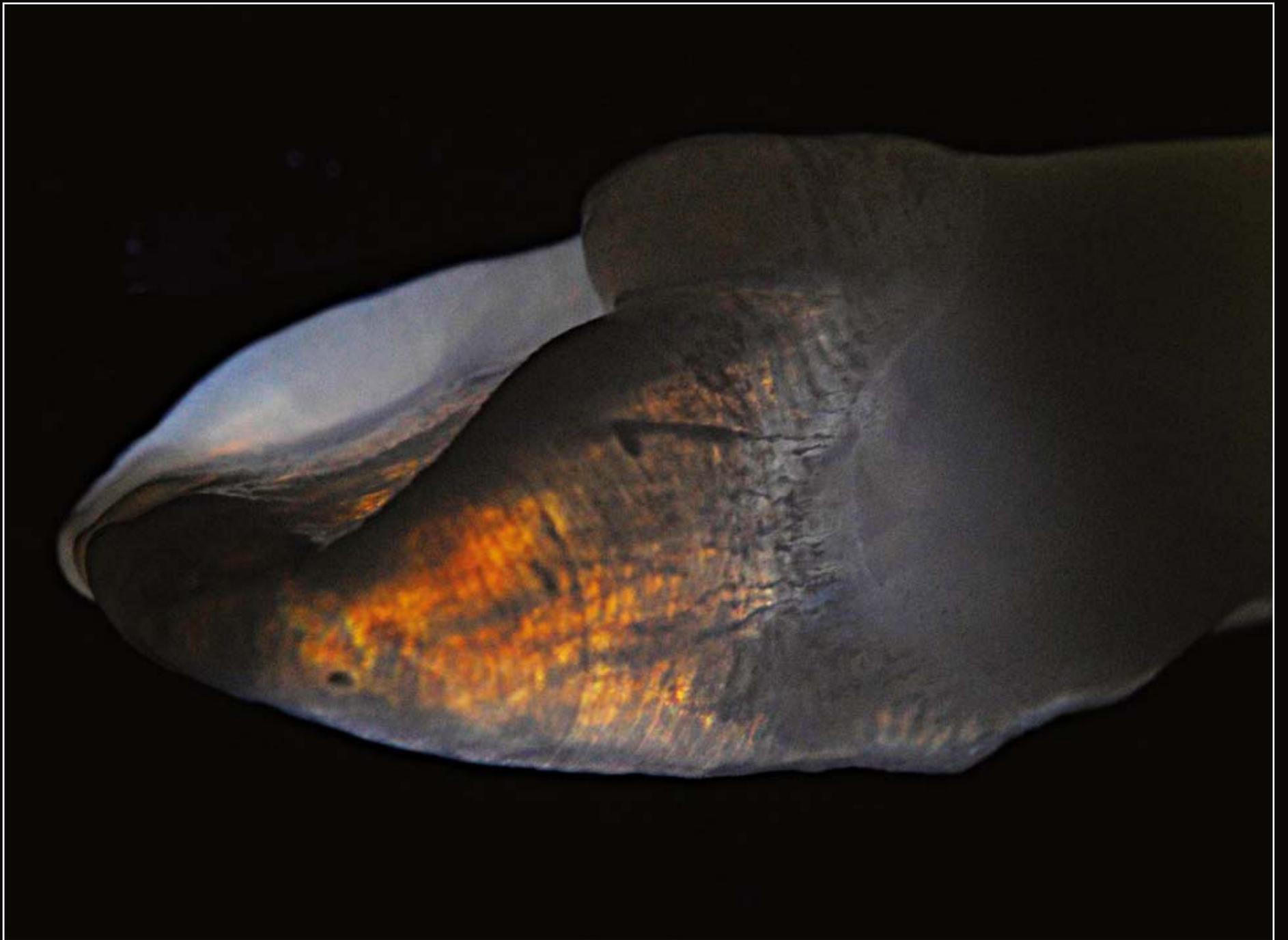
After understanding more clearly with each slice that the color doesn't belong to the object—the natural tooth and its constituents—but to the light that interacts with them, I decided to invite my long-time friend and colleague Sylvio Monteiro Jr, some of the best professionals I have had the pleasure to meet, and some of my best doctoral students from the Federal University of Santa Catarina, in Florianópolis, Brazil, to join me so we could show these images and share them with people who are passionate about dentistry (or

should I say nature?) and to show some of what we have learned over the years about this topic.

We decided to make this book more conceptual, although not less technical; more artistic, although not less practical. We have checked the accuracy of all of the clinical sequences to correlate what we have observed in extracted teeth and their slices with what is possible to achieve clinically using composite resins and dental ceramics.

In order to visually demonstrate the concept of the integration of dentistry and nature, I used the photograph of a maxillary central incisor in slices assembled to simulate a flower (see the final four pages of the book). This montage emphasizes the beauty of the translucent areas of enamel and dentin, especially in the root. The flower implies nature. Nature is universal and holds all the answers to our questions—or should I say feeds us with new questions? Nature, despite its imperfections, inspires us continuously. Because of that, I decided to name this book *Inspiration: People, Teeth, and Restorations*. I was inspired by the differences between people, natural teeth, their imperfections, and their restorations. Finally, I hope our book may help you and inspire you in the task of trying to emulate nature and its imperfections.

A big hug and have a good reading—or should I say have a good inspiration?



acknowledgments

Luiz Narciso Baratieri

Once again I have the pleasure and the great joy to complete a book, the eleventh book in a 33-year career. One more time, I am pleased to see that a number of people who were with us in the first book continue to participate in this new one. Other people also contributed significantly to conclude this work and make it beautiful. Yes: beautiful (I believe) and simple. Without their support, this could not be possible. So, I would like to thank each one, from deep inside of my heart, by listing them here. They are: NAIRA (my wife), and our children: CAROLINA, GABRIEL, and PEDRO. Without their understanding, I would not have been able to write even the first one. EMMANUEL FONTES, a new friend, responsible for the design and all artistic creation. His vibration with each new image, new page, and new detail was fundamental, especially given that the book was made in a short period. FÁBIO ANDRETTI, PhD student at the Federal University of Santa Catarina, for the English version of the greatest part of the book, especially

for his kindness and attention. His eyes always demonstrated happiness when he was doing his tasks brilliantly, even in a hurry. RUI SANTOS, Editor, Quintessence Brazil, for his confidence, kindness, friendship, and great encouragement.

The other authors of this book: my PhD students at the Federal University of Santa Catarina, JACKELINE, LETICIA, and RENAN, for facing this challenge and for giving their best to accomplish their tasks in advance. Professor RENATA GONDO, our new working partner, for her efforts, kindness, and great energy (not mentioning her untiring and magnificent work). DR FRANCIS LIMA, from the beautiful town called Goiânia. He is one of the best oral rehabilitation professionals I have ever met. WILMAR PORFÍRIO, a new friend, for his dedication and brilliant results of a number of ceramic restorations seen in this book. To my long-time partner, Professor SYLVIO MONTEIRO JR, for the lasting, valuable journey we have been through. PAULO KANO: an excellent dentist. Without his

help and active participation this book would be a only dream. He is also one of the best ceramic dental technicians I have ever met.

In addition, I would like to thank other professors that work with me in the undergraduate and graduate programs at the Federal University of Santa Catarina, Florianópolis, Brazil: LUIZ CLÓVIS CARDOSO VIEIRA, MAURO AMARAL CALDEIRA DE ANDRADA, HAMILTON PIRES MAIA, ÉLITO ARAÚJO, GILBERTO MULLER ARCARI, GUILHERME CARPENA LOPES, CLÉO NUNES DE SOUZA, CEZAR ALVES DE ANDRADE, ALFREDO MEYER FILHO, and MIRIAN BECKER.

Finally, I would like to thank the staff at the Federal University of Santa Catarina, Mrs LÉA and Mr BRUNO, and our staff at the BARATIERI DENTAL CLINIC, Ms ROSANGELA, Mrs TEREZINHA, and Ms ADRIANA. Without their support this task would be heavier, even impossible. Thank you all for your contribution. May God continue to protect you and bless your families. Thank you very much!





foreword

Richard **Simonsen**

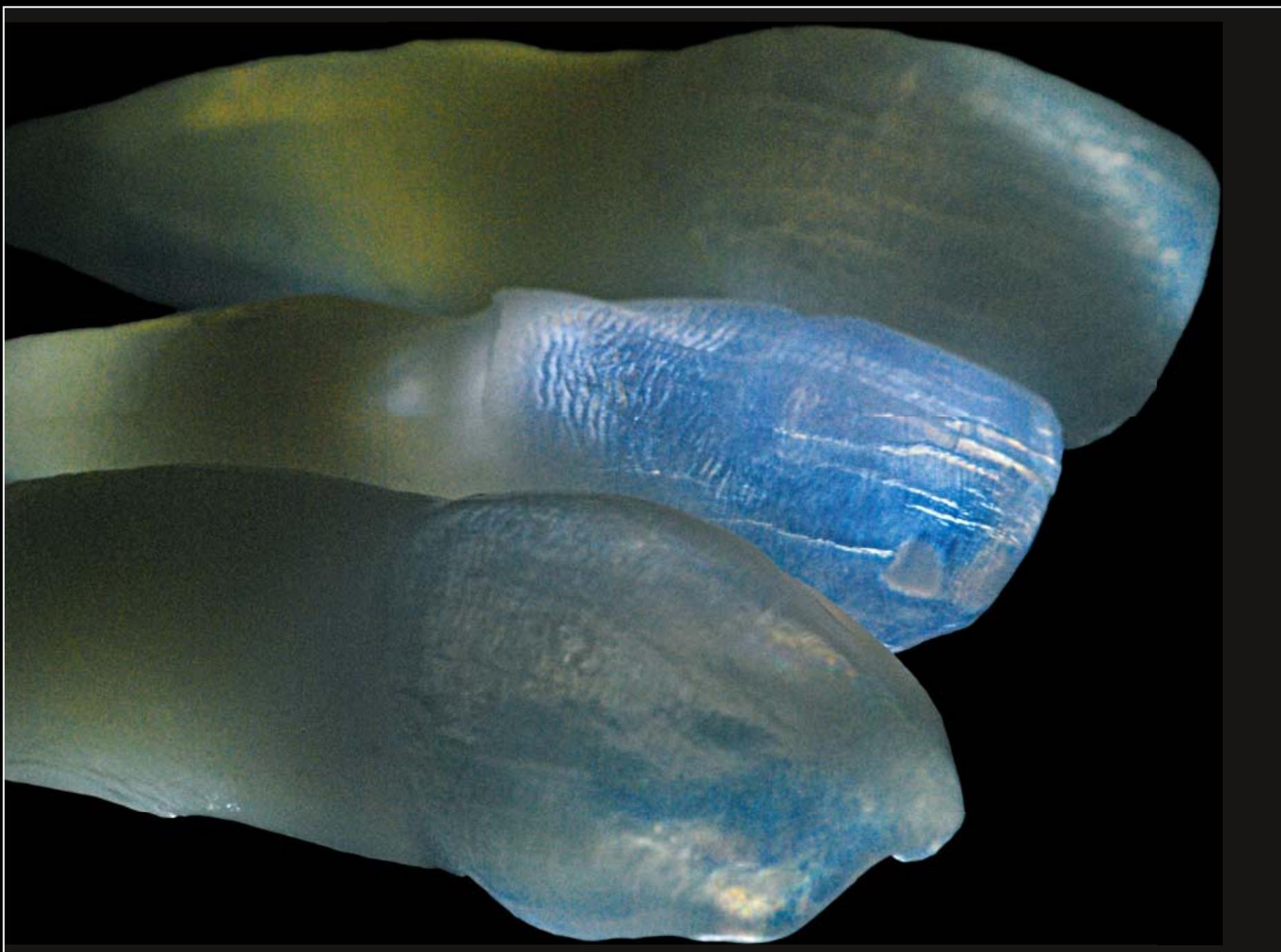
DDS, MS
Professor, Faculty of Dentistry Health Sciences Center,
Kuwait University
Safat, Kuwait

Once again Professor Baratieri has exceeded everyone's expectations with an incredible display of the blending of the art and science of dentistry in his new book, *Inspiration: People, Teeth, and Restorations*.

Over the years I have followed the development of Professor Baratieri's unmatched skills as an expert clinician and photographer. Now he has gone beyond what anyone could expect in this, the ultimate textbook of dental anatomy and restorative dentistry.

Every student needs this book to understand the underlying make-up of the layered structures of the teeth; every dentist needs this book as an educational tool, or just as an incredible book, for patients to view in the reception area; and every educator needs this book to study the techniques that Professor Baratieri uses in his artistic, and unusual, revelation of the natural beauty of tooth structure and form.

Everyone in the dental profession will find something to enjoy and learn in this book. It is a work of art indeed.

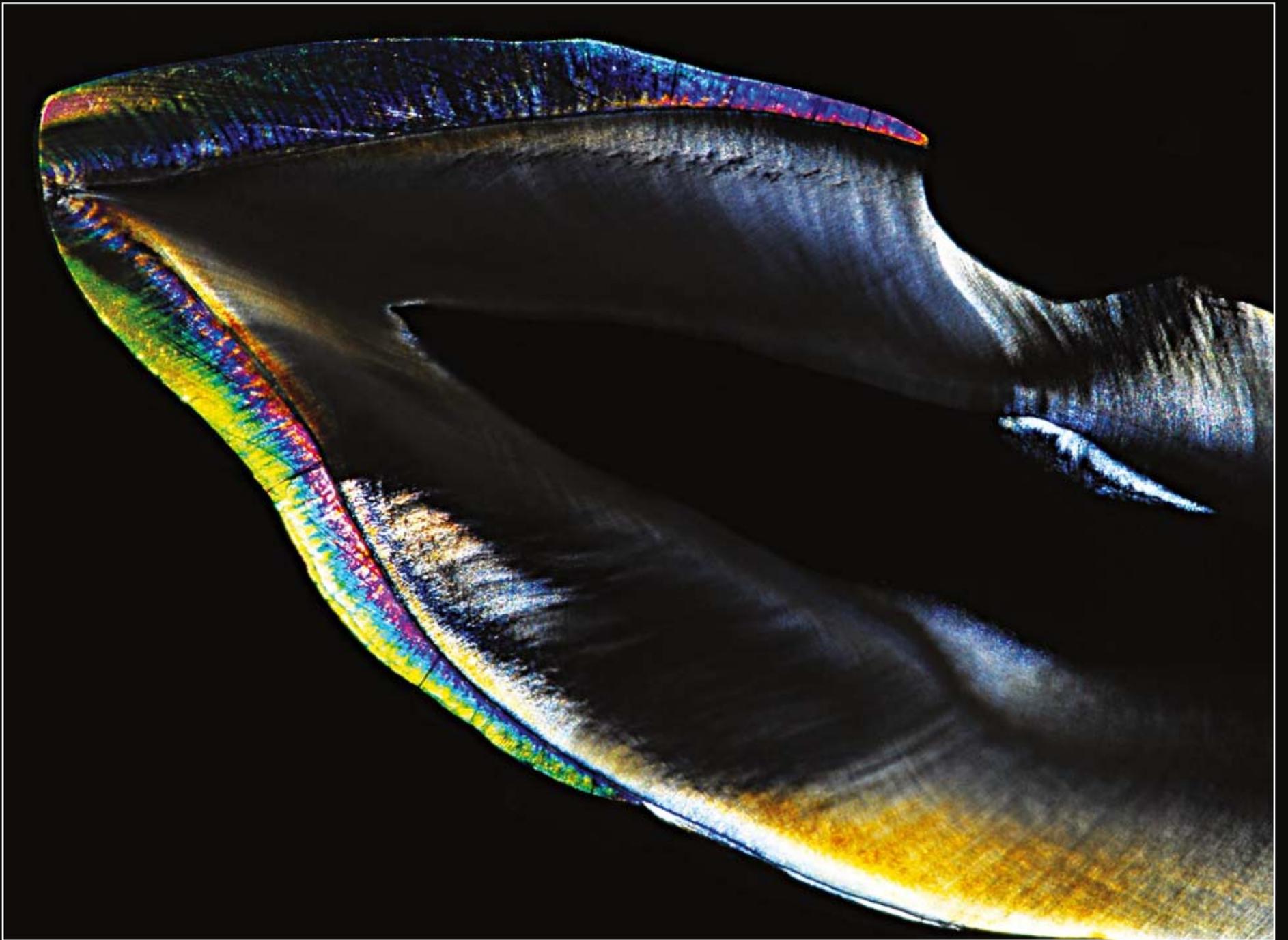




dedication

Luiz Narciso Baratieri

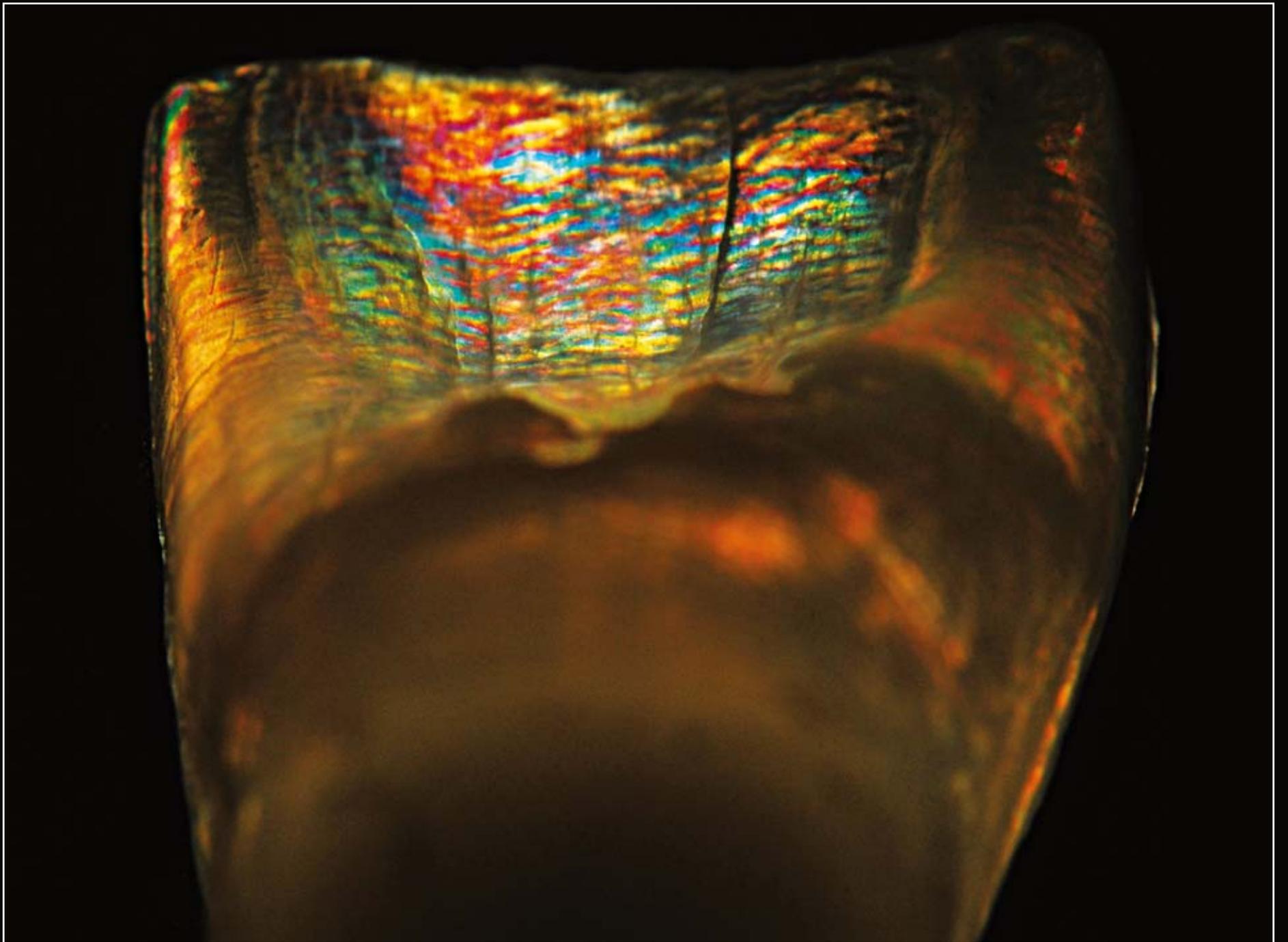
This book is dedicated to all of those who love nature, that is, dentistry.





contents

<u>Introduction</u>	27	<u>Part Two: Using Technology to Create Natural-Looking Restorations</u>	120	<u>Part Three: Clinical Case Presentations</u>	136
<u>Part One: Optical Behavior of Teeth and Restorations</u>	28	<u>CAD/CAM Technology : For the Manufacture of Dental Restorations</u>	121	<u>Dental Bleaching Cases 1–3</u>	137
<u>The Natural</u>	29	<u>CAD/CAM Technology and Its Applications in Dentistry</u>	121	<u>Restoration of Anterior Teeth: Direct Technique Cases 1–6</u>	175
<u>The Parts</u>	33	<u>History of the Development and Use of CAD/CAM Technology</u>	121	<u>Restoration of Anterior Teeth: Indirect Technique Cases 1–8</u>	275
<u>Enamel</u>	33	<u>Steps of CAD/CAM Manufacturing and Workflow Possibilities</u>	122	<u>Restoration of Posterior Teeth: Direct Technique</u>	381
<u>Dentin</u>	80	<u>Modern CAD/CAM Systems</u>	127	<u>Restoration of Posterior Teeth: Direct and Indirect Techniques</u>	387
<u>Dentinoenamel Junction</u>	92	<u>Restorative Materials for CAD/CAM Systems</u>	130	<u>Oral Rehabilitation Cases 1–3</u>	403
<u>Aging</u>	97	<u>Final Considerations and Future Perspectives</u>	135	<u>References</u>	475
<u>The Whole</u>	99				
<u>Counter-opalescence</u>	100				
<u>The Artificial</u>	107				
<u>Composite Resins</u>	107				
<u>Ceramics</u>	114				



introduction

Natural teeth behave as true mosaics from the optical point of view, mosaics that change color according to the type of light and media in which they are found. These mosaics change color over time, according to a number of different factors. Therefore, natural teeth are in fact mosaics that are dynamic and extremely difficult to faithfully reproduce. Restorative materials, especially the latest generation, are able to mimic these mosaics, resembling natural teeth. However, the optical behavior of mosaics obtained with restorative materials, ie, the restorations, differ from those of natural teeth over time, depending on the type of the material. Sometimes, restorative materials present a number of changes that are opposite to the natural mosaics' optical behavior. Notwithstanding, it does not mean that different mosaics of restorations will necessarily be visible under all visible lighting

conditions; rather, they will certainly be visible under specific conditions. Therefore, in order to better understand the optical behavior of the natural teeth and restorations, it is essential to understand the relationship between light and natural tissues. Enamel and dentin present different optical features when analyzed separately, in comparison to when they are joined to form the visible part of the natural teeth. That is, the chromatic expression of a natural tooth is completely different from enamel or dentin when considered individually, even under the same lighting and moisture conditions.

This book was structured in three parts that seem distinct and independent at first, but are truly interconnected and connected to the whole, the people. In the first part (which comprises four chapters: The Natural, The Parts, The Whole, and The Artificial), we introduce some concepts and

images that we find critical for the understanding of the optical behavior of natural teeth and restorative materials. In the second part we present a chapter about restorations fabricated with the aid of CAD/CAM technology (a worldwide trend). In the last part, we present some clinical cases grouped according to the treatment technique applied and, in the case of direct and indirect restorations, the area of the dentition (anterior versus posterior) being treated. The clinical sequences were structured so that the reader, after thoroughly observing them, is able to understand and reproduce different kinds of restorations. Be aware that many pictures are presented without legends, first because we believe that they speak for themselves, and secondly so the reader may seek to understand each one on his or her own terms.

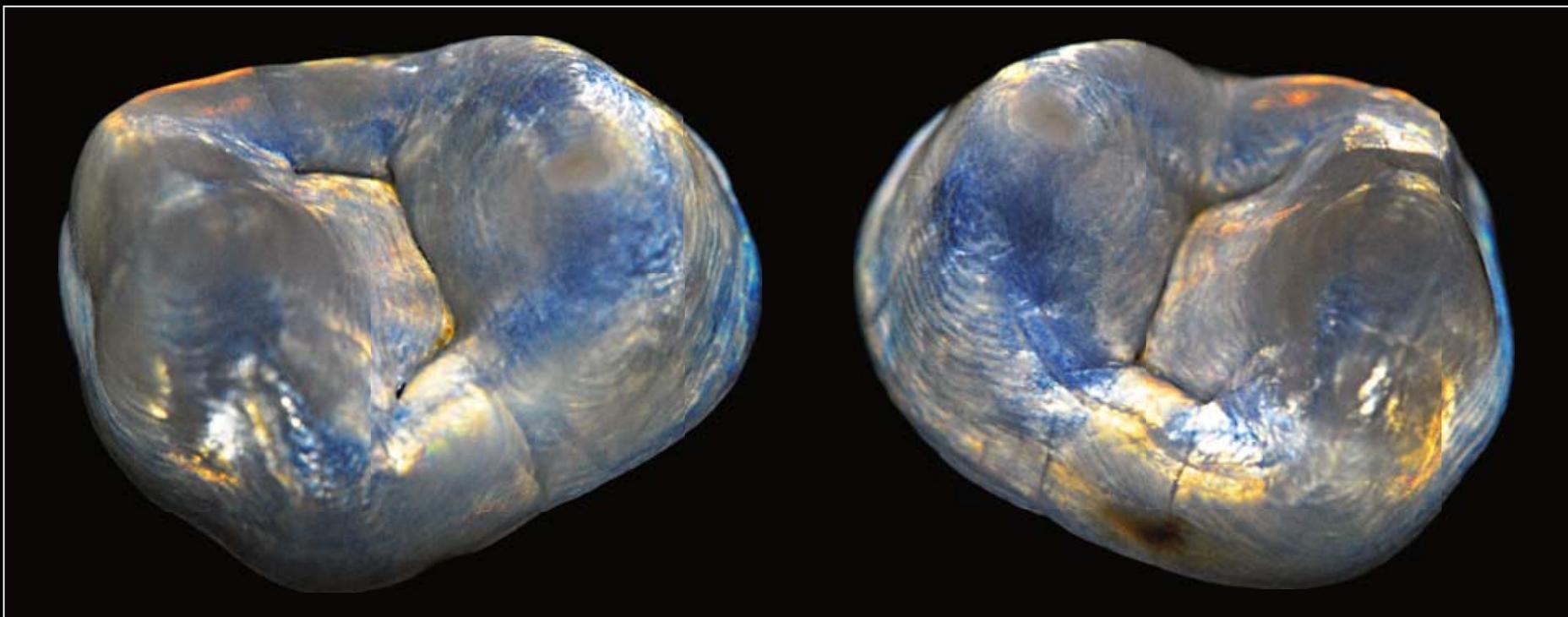


Figure 26.



Figure 27.



Figure 28.

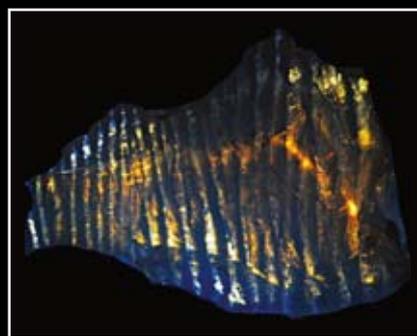


Figure 29.

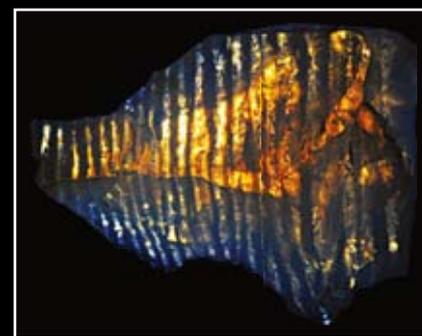


Figure 30.

Figures 26, 31, and 36 to 47 show the enamel portion of premolars and molars after removal of dentin. These enamel crowns are simultaneously illuminated by direct and indirect light, showing both blue and orange shades competing with each other. There are areas of predominance of reflected waves and areas where transmitted waves are more pronounced. Figures 27 to 30 and 32 to 35 show natural crystals occurring in nature that present the same opalescent property observed in enamel.

Figure 31.

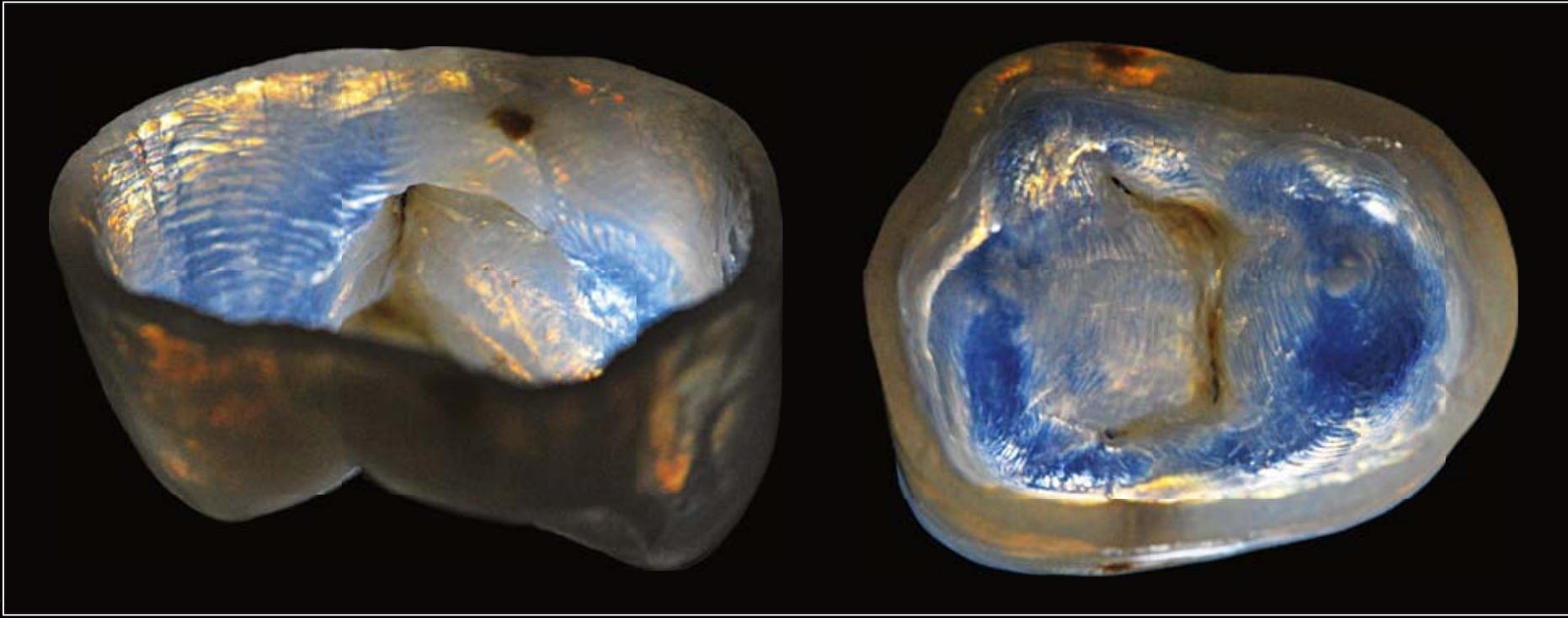


Figure 32.

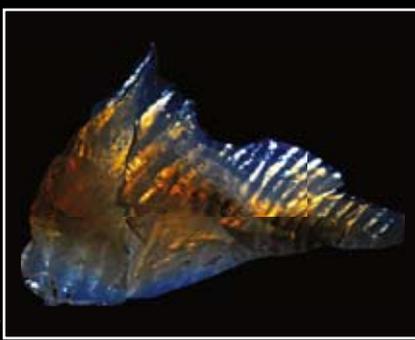


Figure 33.

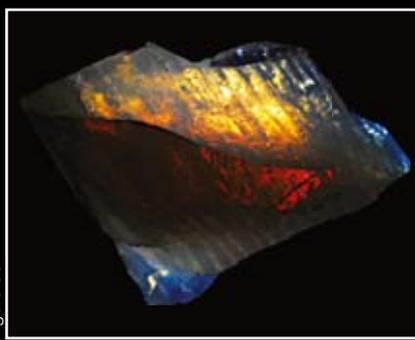


Figure 34.



Figure 35.

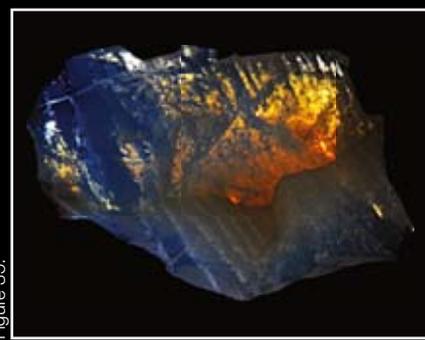




Figure 21.



Figure 22.

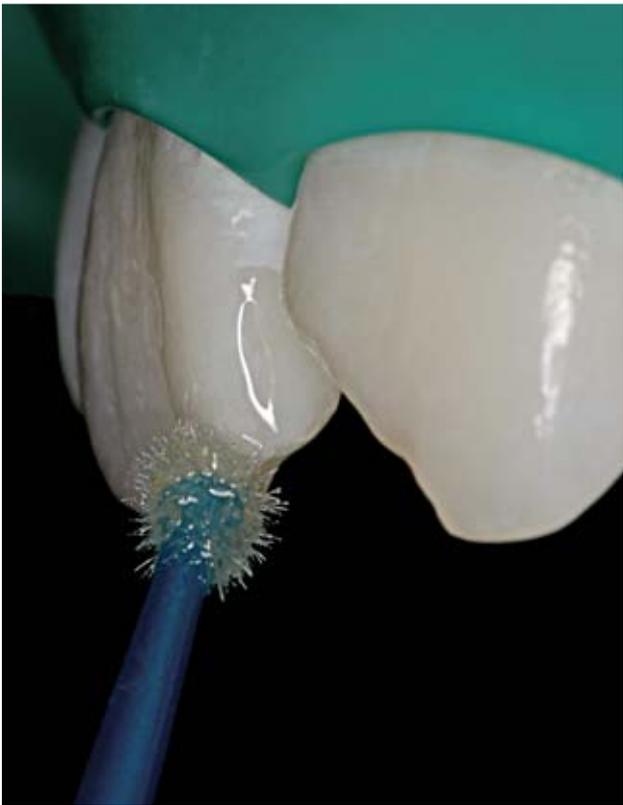


Figure 23.

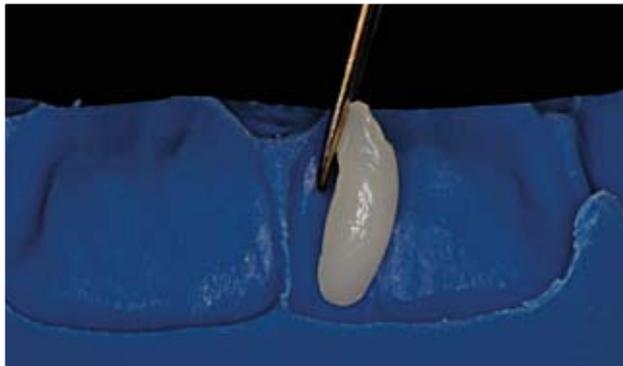


Figure 24.



Figure 25.



Figure 26.



Figure 27.



Figure 28.

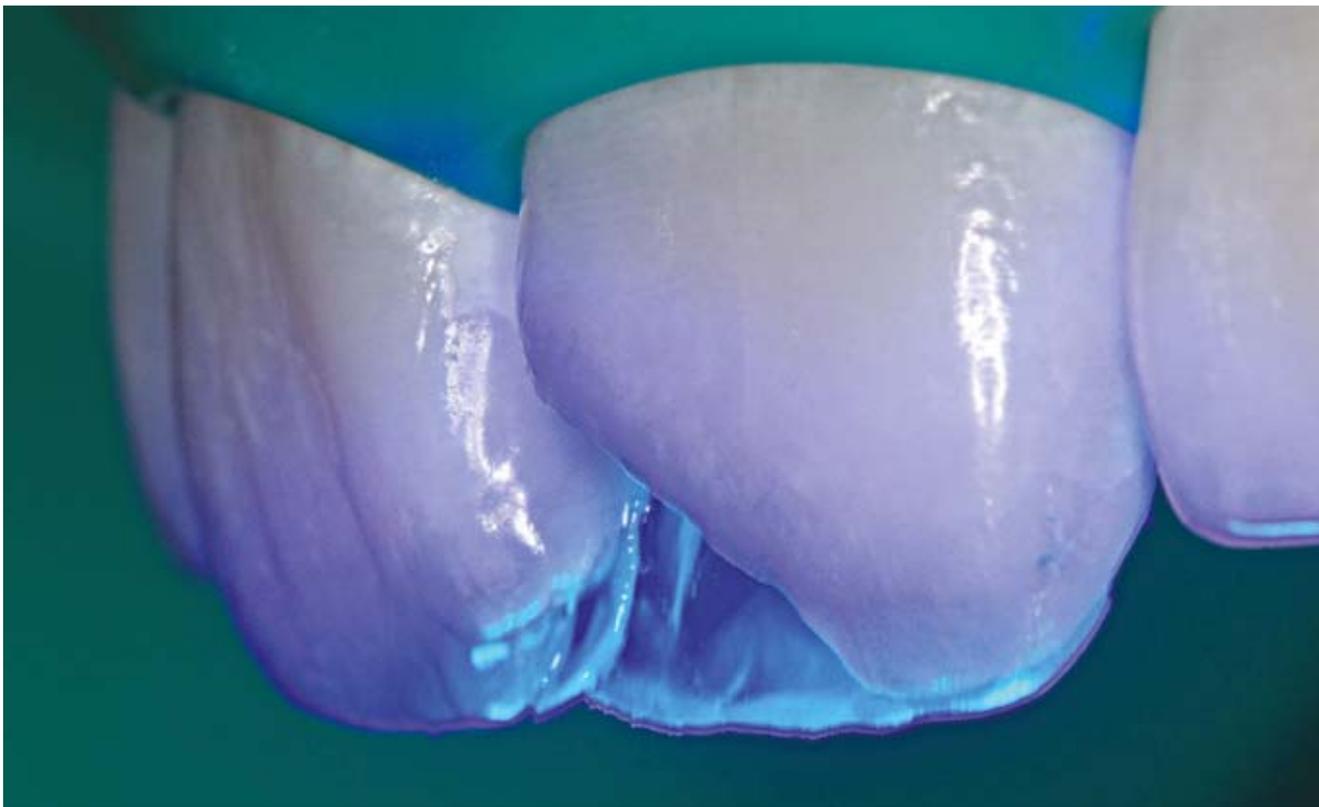


Figure 29.



Figure 16.



Figure 17.



Figure 18.



Figure 19.



Figure 20.



Figure 21.



Figure 22.



Figure 23.



Figure 24.



Figure 25.



Figure 1.



Figure 2.



Figure 3.



Figure 4.



Figure 5.



Figure 6.



Figure 7.

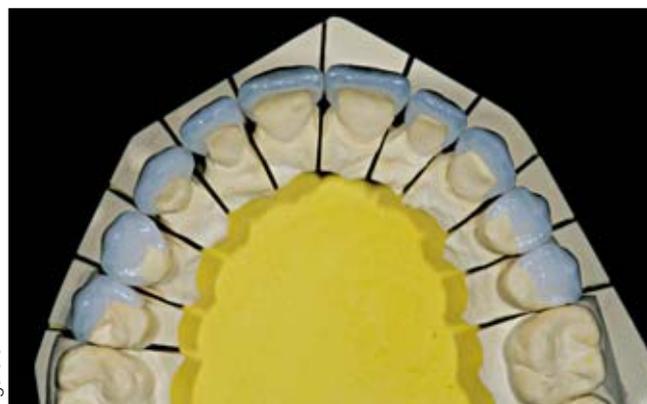


Figure 8.



Figure 55.



Figure 56.

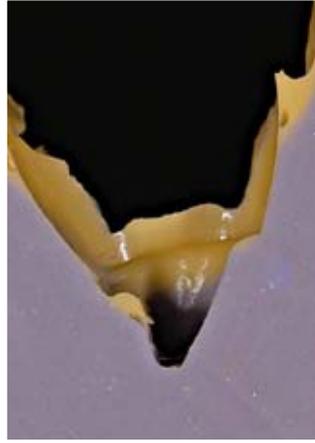


Figure 57.



Figure 58.



Figure 59.

Figure 60.

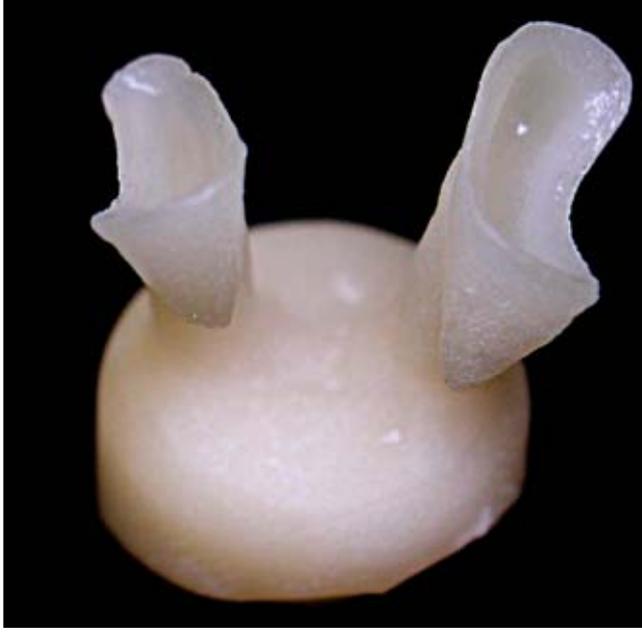


Figure 61.

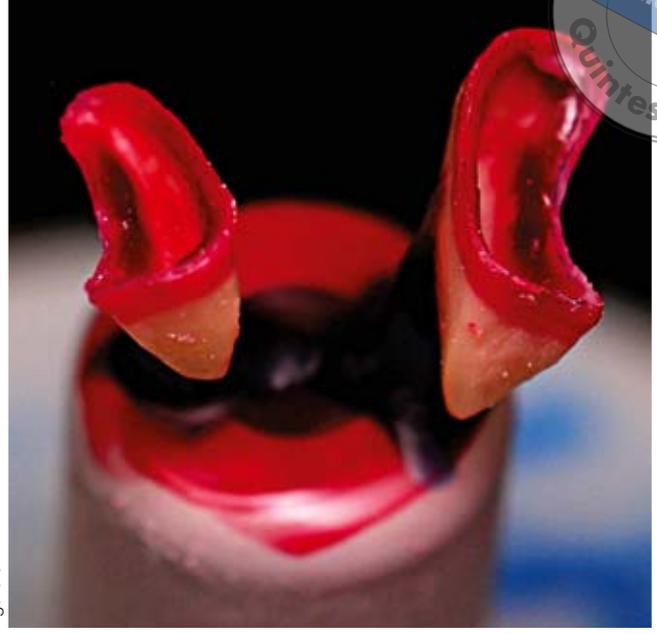


Figure 62.



Figure 63.



Figure 64.





Figure 82.

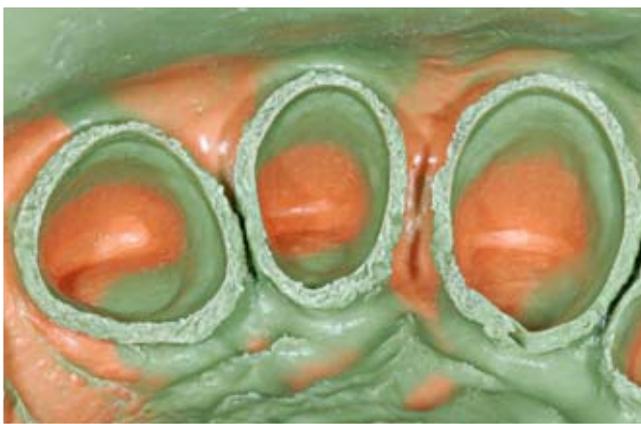


Figure 83.



Figure 84.



Figure 85.



Figure 86.



Figure 87.



Figure 88.



Figure 89.



Figure 90.



Figure 91.



Figure 92.



Figure 93.



Figure 94.



Figure 95.



Figure 96.



Figure 97.