

Fad, controversy or scientific ignorance?

Mario Fernando de **GOES**^{1,2}

(1) Ex-Presidente do Grupo Brasileiro de Materiais Dentários (1997-2003). (2) Universidade Estadual de Campinas, Faculdade de Odontologia de Piracicaba, Departamento de Odontologia Restauradora (Piracicaba/SP, Brazil).

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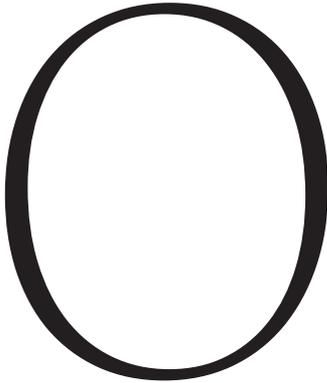
E-mail: degoes@fop.unicamp.br

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Raphael Lee Bowen (1925-2020), in 1962 created the **Bis-GMA molecule**, or Bowen's resin.

In addition to **Bowen's** revolutionary work with composite restorative materials, he **also developed the dental sealants used to prevent caries**. His undoubted contribution to the world of dentistry has led to several honors, including his induction into the Herman Ostrow School of Dentistry of USC Hall of Fame in 1997.



On a Monday morning, penultimate week of July, 1979, there I was again among the members of the Brazilian Dental Material Group (GBMD) to attend another scientific meeting at the federal University of Santa Catarina, Florianopolis. The lecture room seemed a bit old, but cozy. It absolutely provided those 200 seated people with plenty of comfort. Sitting near the back of the room, I could clearly see many professors sitting at the front of the room, with their gray hair inspiring respect and prestige in the dental community.

It was all pretty new for someone who had just graduated in dentistry, like me. So new that I could not hide the combination of shyness and curiosity that mesmerized my eyes as I looked all across the room, trying to recognize each of the faces of the academic members that I looked up to — those I had met

or simply heard of. Notwithstanding, I realized that, not only I, but all the other professors were also enthralled, with their eyes aimed at the stage eagerly waiting for the lecturer.

And among all those attendees with overflowing enthralment, manifested by a profusion of voices, I saw frenzy combined with exhilaration, induced by their craving for science and their admiration for the whole representativeness of the lecturer. In that time, I have to say, I didn't have enough academic-scientific awareness and maturity to share the same feelings of those professors; yet, my curiosity was immense since that was my second attendance in the GBMD meeting.

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Professors from different cities and states were overwhelmingly glad to bring their respective spouses to such a prestigious event which provided a romantic and glamorous moment for all the members of the GBMD meeting, whose social program included a city tour, fancy dinners and plenty of interaction among the participants. It was a time when interaction and exchange of ideas and knowledge were welcoming and deeply prized. Access to academic and scientific information was a great challenge among the professors in all institutions across the country.

New issues of journals, or scientific papers, took longer than a year to be available in the libraries of Brazilian

universities. Not to mention that only a few libraries subscribed the high-quality journals. The world was not as globalized, and information was not as widely available as it is today via Internet. Professors vibrantly and friendly shared scientific findings and experiences as a form of updating each other’s knowledge. GBMD was then founded in 1965 with this specific mission to update their members and collaborators scientifically.

With great expectation and absolute silence, the audience avidly watched the special guest and American researcher Raphael Lee Bowen come onto the stage soon after he was introduced by one of the members of GBMD. The

inventor of the Bis-GMA molecule, or Bowen’s resin (1962), Mr. Bowen, average height, around 50 years of age, dressing a light gray suit, started his presentation by showing his humbleness as he apologized for not speaking Portuguese and added that he would make an effort to speak slowly as to make the simultaneous translation as clear as possible.

Mr. Bowen spent hours talking, with great details, about pure science concerning a field about which most professors in the audience had only little knowledge to understand all he was saying, even after nearly 20 years of its publication. And it was so true that many had no opinion at all or gave little or no credibility to that restorative material being discussed. In fact, the attendees wondered if that would be just another fad, or something to create polemic, or a topic to be refuted just because of scientific unawareness.

After 17 years of his life dedicating to his scientific discovery, during all his presentation, Mr. Bowen struggled to prove its reliability and effectiveness for clinical use; however, most attendees were stuck in a thought trying to figure out how they would replace amalgam or silicate with some new, unknown material such as the one being presented. Unfortunately, the mindset of many in dental communities holds a consensus that the educational process is extremely complex and that new concepts cannot be internalized overnight. Actually, any radical change is a challenge for the conservative, even if scientific evidences are provided.

In front of those academic members would stand Mr. Bowen, one of the iconic innovators in dentistry. With plenty of naturality, he presented how he succeeded in developing a new molecule, which served as the basis of a resin composite, considered today another milestone in contemporaneous dentistry. Perhaps, because of their 'scientific ignorance' or because they thought it was some fad only to create polemic, many of the attendees lost a great opportunity in their life to learn about what would later revolutionize esthetic dentistry.

Fortunately, organizers of the GBMD meeting viewed the importance of that historic event and recorded the entire presentation in a 'cassette tape.' The audio was transcribed and typed in many pages. A year after the event, all the members of GBMD were given a copy of that transcription, thoroughly describing how that resin composite was developed. Transcription of a presentation occurred only once in the whole history of GBMD.

So far, it is impossible to estimate how many of the GBMD members read that transcription. But I am proud to say that I patiently read it several times until I could understand it all; I realized it held the basis of everything that has been done in esthetic dentistry over the past 30 years. Among so much information provided in that booklet, one detail that really grabbed my attention was that the development of the composite included the bonding of an organic matrix to inorganic fillers.

For this, Mr. Bowen resorted to a chemical company, where he learned about the need for another monomer to coat that quartz filler and create a bonding condition between the filler surface and the organic matrix. This monomer is popularly known as silane, which should be applied to the filler at a low pH environment to attain a faster and more effective condensation reaction. Only this condition is enough for dentists to figure how much physicochemical-related knowledge is needed to understand what is done today in clinical settings.

I just imagine the difference it would have made if dentists in general had had the opportunity to read that booklet of GBMD containing the whole description of Bowen's course. Today it would all be much clearer in clinical settings. No dentist would have a problem understanding why silane is provided in one or two bottles. There would be no doubt about whether or not to apply the silane on the fiber post surface, whether or not to apply it while fixing a restoration using resin composite, and whether or not to apply it on resin composite surfaces in indirect restorations before cementation. There would be no misleading comments on the social network saying, "Only the hydrofluoric acid can create micro-retention on surfaces of resin composites with over 80% of glass nanofillers."

All in all, it would be easier to understand that the organic matrix is composed of monomers which, after polymerization, turn into polymers, having the carbon as the chief element. Also, it would be clearer for researchers that glass fillers can be called ceramic particles — because they are composed of silicon dioxide — and that silane is composed of two functional groups, one at each end of the molecule. On one side lies the polymerizable methacrylate group, which chemically binds to the non-polymerizable organic matrix (monomer) and, on the other, the alkoxy (R-O) group which is hydrolyzed to form the silanol (SiH_3OH) before binding to the inorganic substrate (ceramic).

Now, forty-one years after Mr. Bowen's course in Brazil, dental practitioners might better understand the futuristic content described during his presentation concerning the resin composite and how determinant it was towards changing the concepts of today's simplified and conservative esthetic restorative dentistry when associated with the legacy left by Buonocore (1955) and Nakabayashi (1982). What you hear and read might make a huge difference in clinical settings. What's more, it is crucial to remember and emphasize that knowledge is the soul of a professor and the most resourceful 'archive log' on the website of dental history. In a scenery unbacked by science, the individual is stuck with scientific unawareness and promotes 'fad' and 'polemic' to boast himself about what he thinks he knows, but does actually not.