The features marked with a star (*) are based entirely on material taken straight from standard research (and other Official and Therefore Always Correct) literature. Many of the other articles are genuine, too, but we don’t know which ones.

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**On the Front Cover**

The upraised big toe—the Babinski sign—evident in a child, in a Renaissance painting. See page 11 and page 22.

**On the Back Cover**

An unidentified man stands inside a spiracle on a lava field near Laxamyri Iceland, 1893.

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**Some Coming Events**

The Covid-19 pandemic has introduced excitingly boundless uncertainty as to whether, when, where, and how various public activities will happen in the near future. In 2021 some will happen teledistantly.

See IMPROBABLE.COM for details of these and other events:

**September 9, 2021**
The 31st First Annual Ig Nobel Prize Ceremony and Webcast

**September 10-November 3, 2021**
Ig Nobel Museum Exhibition, Fukuoka, Japan

**September–November 2021**
Ig Informal Lectures [online]

**October 19, 2021**
New York City, USA

**January 14, 2022**
Arisia, Boston, USA

**January 20, 2022**
Improbable Conversation series premiere (online)

**Spring 2022**
2022 Ig Nobel Euro (and Brexitannia) Tour [if the pandemic allows]

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**The Improbable Research podcast is back!**

https://www.improbable.com/
category/the-weekly-improbable-research-podcast/

**Where There's More**

There's always new improbable — it's not what you expect! — stuff on the Improbable Research blog at IMPROBABLE.COM
Using Chewing Gum to Train Young Children

“Masticatory Training with Chewing Gum on Young Children,”

Mastication is a developmental function. It matures through learning experiences. The biting force is one of the components of masticatory function. The biting force increases with age. During the developmental stage, it is believed feasible to enhance the maturation of the masticatory function by increasing the biting force.

The previous results of masticatory training for adults and school children had revealed 20% to 30% increase of the biting force.

In this study, masticatory training with specially fabricated chewing gum for young preschool children was performed. The subjects were 5 males and 5 females from 3 years old to 5 years old. These children were instructed to bite on the chewing gum for 5 minutes, 2 times a day, for 3 months. The results show that there was a 94% average increase of biting force after 3 months of training. It was also noted that the rate of the increase of the biting force was remarkable during the first month of training.
**CHILDREN CHEWING** [continued]

**Chewing and Long Faces**

Daily chewing of a tough chewing material consisting of resin from a pine tree (Mastix from the island of Chios, Greece) was instituted in 13 children (aged 7-12 years) with long-face morphology. The chewing exercise therapy was maintained for one year and aimed at revealing the possibility of strengthening the masticatory muscles and influencing facial growth. Masticatory muscle strength was monitored by measurement of bite force and electromyographic recording of the activity of the anterior temporal and masseter muscles during biting and chewing. The facial morphology was recorded with profile cephalograms and dental casts. During the one-year experimental period, the facial growth was characterized by anterior mandibular rotation in 9 of 12 cases while a posterior rotation occurred in 2 cases. The anterior rotation was, on average, 2.5 degrees and thus considerably greater than would be expected during normal growth.

**Chewing Gum Bezoars**

Children have chewed gum since the Stone Age. Black lumps of prehistoric tar with human tooth impressions have been found in Northern Europe dating from ~7000 BC (Middle Stone Age) to 2000 BC (Bronze Age).... In the present report, we briefly review gum-chewing complications and describe three children who developed intestinal tract and esophageal obstruction as a consequence of swallowing gum.... In summary, chewing gum should not be swallowed and not given to children who cannot understand this point.

**TABLE 1. Complications From Additives to Chewing Gum**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea, flatulence, borborygmia</td>
<td>Sorbitol</td>
</tr>
<tr>
<td>Mouth ulcers</td>
<td>Cinnamon flavoring</td>
</tr>
<tr>
<td>Perioral dermatitis</td>
<td>Gum oils</td>
</tr>
<tr>
<td>Diffuse cutaneous urticaria</td>
<td>Chlorophylla, menthol</td>
</tr>
<tr>
<td>Dental caries</td>
<td>butylhydroxytoluene</td>
</tr>
<tr>
<td>Hypertension, hypokalemia</td>
<td>Licorice (glycyrrhetinic acid)</td>
</tr>
</tbody>
</table>

**TABLE 2. Adverse Mechanical Effects of Chewing Gum**

<table>
<thead>
<tr>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrusion of dental work</td>
</tr>
<tr>
<td>Temporomandibular joint syndrome</td>
</tr>
<tr>
<td>Hypertrophy of masticatory muscle</td>
</tr>
<tr>
<td>Increased serum mercury level</td>
</tr>
<tr>
<td>Increased air swallowing</td>
</tr>
<tr>
<td>Occlusion of endotracheal tube</td>
</tr>
<tr>
<td>Esophageal or colonic bezoar</td>
</tr>
</tbody>
</table>

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Chewing and Long Faces

**A pilot study of the effect of masticatory muscle training on facial growth in long-face children**

Bengt Ingervall and Elias Bitsanis
Orthodontic Clinic, University of Bern, Switzerland

**Summary**
Daily chewing of a tough chewing material consisting of resin from a pine tree (Mastix from the island of Chios, Greece) was instituted in 13 children (aged 7–12 years) with long-face morphology. The chewing exercise therapy was maintained for one year and aimed at revealing the possibility of strengthening the masticatory muscles and influencing facial growth. Masticatory muscle strength was monitored by measurement of bite force and electromyographic recording of the activity of the anterior temporal and masseter muscles during biting and chewing. The facial morphology was recorded with profile cephalograms and dental casts.

*Fig. 1. Four coins stuck in gum lodged in esophagus.*

Detail from the study “Chewing Gum Bezoars of the Gastrointestinal Tract.”