Shirlaw, pp. 245-46:

(p. 245)

But if these new kinds of Enharmonic are not explained in the *Génération Harmonique,* Rameau, on the other hand, treats of them at considerable length in his *Démonstration.* The *Diatonic Enharmonic* is explained as follows:

> "The alternate succession of a **P5** (Fifth) and a **M3** (major Third), in which the triple progression is combined with the quintuple, gives a composite genus, called *Diatonic Enharmonic;*
>
> the semitones which are its products form a whole-tone step which is a quarter of a tone too large; thus these semitones, which are both diatonic, necessarily introduce the Enharmonic into the tone which they form, which makes its performance difficult for the voice but not impossible":--

Here we find at *b♭-a,* a diatonic semitone, and another at *a-g♯*.[1]

Adding these semitones together, we have an interval of the proportion $\frac{15}{16} \times \frac{15}{16} = \frac{225}{256}$.

Comparing this with the whole-tone of the proportion 9 : 10, thus $\frac{9}{10} \times \frac{256}{225}$, we obtain Rameau's quarter of a tone, that is $\frac{125}{128}$.

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1 Here B♭ in treble clef is ¾ of F, in the bass; while A is $\frac{5}{4}$ of F.

Comparing these, we obtain $\frac{3}{4} \times \frac{5}{4} = \frac{15}{16}$, that is, a diatonic semitone.

Again A, in the bass, is $\frac{3}{2} \times \frac{5}{4}$ of B♭ in the bass, and $= \frac{15}{8}$:
while E is $\frac{3}{2} \times \frac{15}{8} = \frac{45}{16}$, and G♯ is $\frac{5}{4} \times \frac{45}{16} = \frac{225}{64}$,
which, compared with a $\left(\frac{15}{8} \times \frac{2}{1} = \frac{30}{8}\right)$ is $\frac{225}{64} \times \frac{8}{30} = \frac{15}{16}$.

A-G♯, therefore, is also a diatonic semitone.

This quarter-tone, compared with unity $\left(\frac{128}{128}\right)$ gives us $\frac{3}{128}$, or nearly $\frac{1}{42}$.

The interval *g♯-b♭* is known to theorists as a **<u>d3</u>** (diminished Third), that is, a **<u>m3</u>** (minor Third) diminished by a chromatic semitone as $\frac{5}{6} \times \frac{25}{24} = \frac{125}{144}$.

If we compare this interval with that formed by adding two semitones together, we obtain $\frac{125}{144} \times \frac{256}{225} = \frac{80}{81}$.

The two intervals therefore are not the same, but differ by a comma.

(p. 246)

As for what Rameau calls the *Chromatic Enharmonic* genus, the procedure is as follows:

> "If the bass descends a **<u>m3</u>** (minor Third), and then rises a **<u>M3</u>** (major Third), while the harmony above each sound of the fundamental bass is now major and now minor, there arises a composite genus called *Chromatic Enharmonic,* inasmuch as it gives rise to two minor semitones in succession which together form an interval a quarter of a tone less than a whole-tone":[2]

(p. 246)

Here, the interval *e♭-e♯,* composed of two chromatic semi-tones $\left(\frac{25}{24} \times \frac{25}{24} = \frac{625}{576}\right)$ is a quarter of a tone less than a minor tone $\left(\frac{625}{576} \times \frac{9}{10} = \frac{125}{128}\right)$.

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[2] *Démonst.,* pp. 94, 95.