# Drinking Bottled Mineral Water: would legal notices be usefule?

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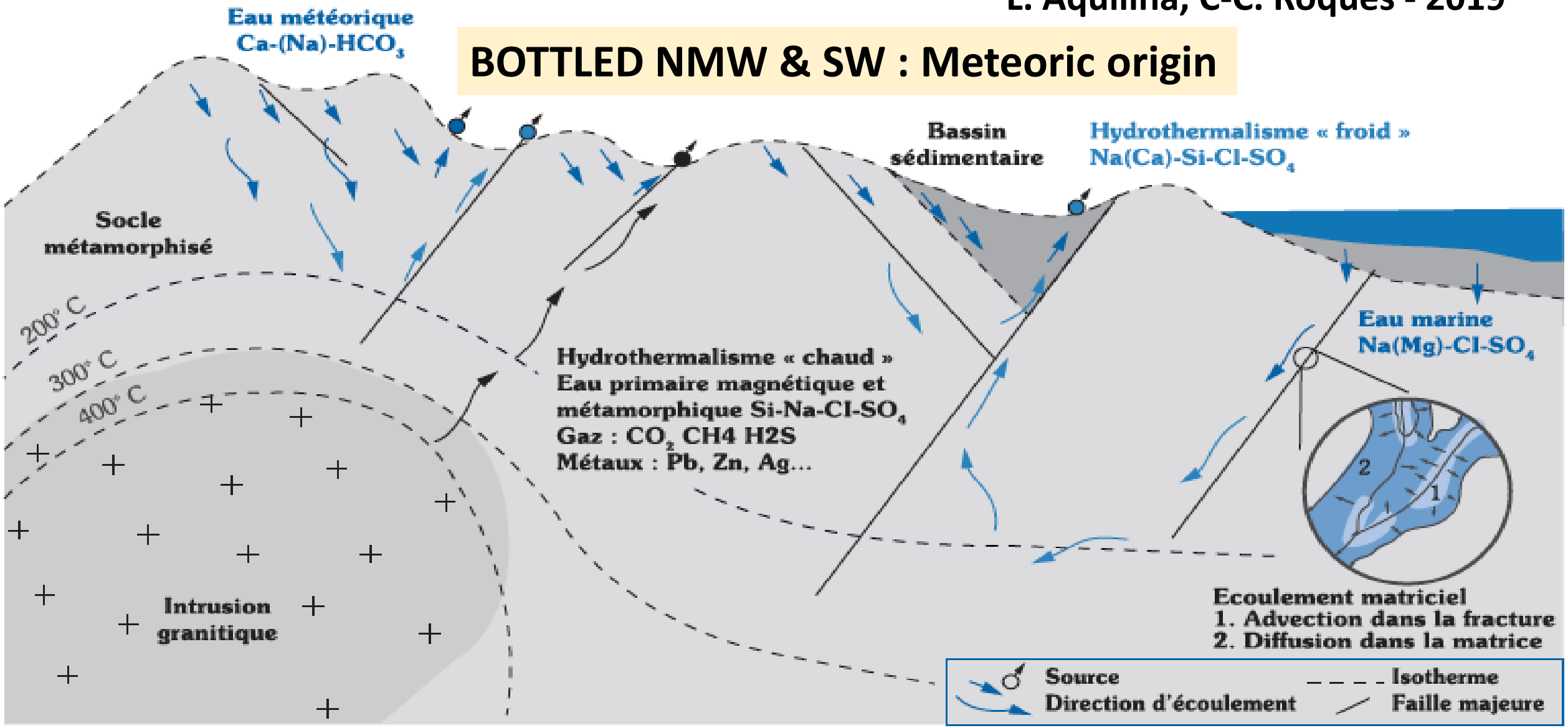
# Water intended for human consumption

- **Water from the public distribution network:** variable origin, authorized treatment (tap water)
- **Deep groundwaters**
  - **Natural mineral water (EMN):** free from contamination, protected, stable, particular stable mineralization (facies), no authorized treatment, use in thermal baths and bottling.
  - **Spring water (low mineral content) bottling**
- **Water made drinkable by treatment** (osmosis, etc.)
- **Seawater** desalination
- **Other waters, …**

L. Aquilina, C-C. Roques - 2019

# BOTTLED NMW & SW : Meteoric origin




# Sulfide, sulfate, bicarbonated, brine, polymétallic waters

# Therapeutic use of NMW

- **SPA THERAPY**
  - **NMW AND THERMAL PRODUCTS ARE PUT INTO CONTACT WITH DAMAGED TISSUES:** Dermatology, Airways, Female genital tract, Oral cavity, Large intestine, etc.
  - **THE BODY IS IMMERSED IN WATER TO TREAT INTERNAL SYSTEMS AND ORGANS:** Rheumatology, Neurology, Vascular diseases, Stress-related conditions, Urinary system, Metabolic conditions, etc.
- **DRINKINING NMW**
  - **Hydropinic treatment (NMW):** urinary, digestive, metabolic disorders
  - **At home:** NMW, spring water

# Why drink bottled water
## (qualitative study – Ward 2009)

1. Better **taste**
2. Fear that the **water served in carafe** would be **contaminated**
3. **Non-toxic plastics used** (no endocrine disruptors)
4. Good for **health**
5. **Carbon footprint** problem

# Natural Mineral Water and Spring Water: BOTTLING = 9.3 B L

| Bottled Water France | NMW (Billions L) | Spring Water (SW) (Billions L) |
|---|---|---|
| Still water | 2.9 | 4.6 |
| Sparkling water | 1.4 | 0.1 |
| Flavoured waters | 0.2 | 0.03 |
| TOTAL | 4.6 | 4.7 |

**100 L/person in France, yearly**

**EXPORTATION : 2.7 B L. (NMW 90% ; SW : 10%)**

**80 different NMW bottled in France**

# NMW: comparison of bottling and spa

| | SPA* TREATMENT | BOTTLING** |
|---|---|---|
| QUANTITY NMW (Billions L) | 5 | 7 |
| TURNOVER (Billions €) | 0.5 | 2.5 |
| DIRECT EMPLOYS (FTE) | 6,600 | 7,300 |
| INDIRECT+INDUCED JOBS | 19,210 | 26,000 |

** Conseil national des établissements thermaux*
*** Maison des eaux minérales, Paris*

# NMW intended for beverages – scientific approach

- Considerable **economic stakes**
  - Bottling for **drinking**
  - **By-products** (flavoured waters, dermo-cosmetics) +++
- **Scientific evaluation easier than for spa treatments**
  - **Laboratory** models, animal experimentation,
  - Facilitated, inexpensive, possibly double-blind **clinical trials,…**
  - **Population** studies

# Governmental referral on labeling information for packaged water

## (transposition into French law circular EU 2020) CONSUMER INFORMATION – PREVENTION OF ABUSE

- "May be **diuretic**"
- "**Contains more than 0.3 mg/L of fluorine: not suitable for infants** for regular consumption in the event of medical fluoride supplementation".
- “**Stimulates digestion**”
- »Can be **laxative**"
- “Can **promote hepatobiliary functions**”

# Data used

- Population-based **observational studies,**
- **Clinical** trials**,**
- Summaries, reports, … of **learned societies, public agencies, international organizations** (WHO, EU, …).

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Rapport et recommandations de l'ANM

# Rapport sur les mentions d'étiquetage des eaux conditionnées (Saisine Direction générale de la santé – DGS – du 16 juin 2021)

# Report on the labeling of packaged waters ☆

C.-F. Roques-Latrille [a] ✉, J. Hubert [a], Y. Lévi [a], J.-M. Bourre [a], R. Ardaillou [a], C. Buffet [a], C. Géraut [a], J.-M. Hascoët [a], C. Roux [b], D. Lecomte [a], D. Bontoux [a], P. Queneau [a], B. Charpentier [a], B. Falissard [a], commission 3 (Thérapies complémentaires, thermalisme, eaux minérales) de l'ANM 1

# Statement "may be diuretic"

- **FINDINGS**
  - The **diuresis** by ingestion of conditioned water (mineral, spring, etc.) **is aqueous** (volumes absorbed, nycthemeral cycle AVP.)
  - An effect of an **osmotic nature could only be observed for a very high concentration of mineral salts, little or not re-absorbable** (not the case of NMW and other packaged water used as drinking water).
  - The **decrease in aldosterone secretion** (Schoppen, 2008 ; Toxqui, 2015) after bicarbonated water drinking has not been confirmed .
- **RECOMMENDATIONS**
  - *Current data on the physiology of diuresis make it **unfounded to mention "may be diuretic"** for a particular water.*

# Fluorine - constatations

- **Fluorine intake** fluctuates according to the concentration of Fluorine in the water
- **Fluorine has an affinity for calcified tissues** where fluorapatite replaces hydroxyapatite. (Buzalaf, 2011)
- **Fluorine deficiency leads to dental caries** (Dean, 1936) **prevented by fluorination** of water for human consumption (+/- cooking salt) according to international recommendations (WHO, 2004, 2017).
- **A fluorine intake is not beneficial for the skeleton** (no prevention of fractures) (Johns, 1999; Phipps, 2000; Li, 2001).
- **Excess fluorine is harmful** for the **skeleton**, the **teeth.** (WHO, 2010)
- But also the **brain of children** (cognitive disorders +++): **- 8 in IQ per additional 1 mg of fluorine** in the water (Grandjean, 2019)

# Fluorine - recommandations

- **Fluorine intake** should not exceed 0.05 mg/kg/d (AFFSA, 2005)
- **Concentration of 0.7 mg/L water is sufficient** (WHO: O'Mullane et al., 2016), to prevent fluorine deficiency without deleterious effect.
- **Children**: supplementation if fluorine content below 0.3 mg/L (Soc. Canada. Pediatrics, 2021).
- ***Current standards: fluoride would not exceed***
  - *1.5 mg/L water intended for human consumption (except NMW)*
  - *0.5 mg/L (infants and children under 1 year old)*
  - *0.3 mg/L if medical fluorine supplementation.*

# Mention « stimulates digestion »

- **Bicarbonated water** (0.5 to 1 L: 300 to 400 mg BiNa in 24 hours) improves digestion (Bertoni, 2002 ; Rocca, 2007) by promoting
  - i) **gastric emptying**,
  - ii) secretion of **digestive hormones**;
  - iii) **choleretic and cholagogue** actions.
- **Carbonated water** (C02) (without significant mineral content) promotes **satiety** and **gastric activity**. (Wakisaka, 2012)
- ***Recommendations*** *: the mention* ***"Stimulates digestion"*** *can apply to bicarbonated water for the concentration of* ***600 mg/L.***
- *The* ***sodium content*** *of some of these waters may be excessive for hypertensive and heart failure patients.*

# Mention « laxative effect »

- **Drinking: 1 month, 1 liter of sulfate water/day** (0.5 g to 1.5 g of sulfate, 100 mg of magnesium) improves constipation in adults by **osmotic laxative** effect. .(Dupont, 2014; Naumann, 2016).
- In **children, the laxative effect** is due to phenomena of **colitis and gastroenteritis**. (Chien, 1968 ; Becker, 2000).
- Sulfate water for **child constipation = medical prescription**.
- Sulfate water : **purgative from 5gr** (coloscopy).
- *Recommendation: the mention «**laxative effect**» is justified **for sulfated waters** from*
  - ***200 mg/L in adults***
  - ***140 mg/L in infants and children.***

# Mention "promote hepatobiliary functions"

- **Findings**
  - **Bicarbonated** water has a **choleretic and cholagogue** action (benefit in dyspepsia linked to functional disorders of the bile ducts) (Toxqui, 2012) .
  - **Sulfated bicarbonated** waters have a **choleretic and cholagogue** action. (Fraioli, 2010 ; Corradini, 2012 ; Mennuni, 2014)
  - **Magnesium sulfate** waters promote the secretion of **cholecystokinin and choleresis**. (Bothe, 2017)
- ***Recommendations***
  - *Only the mention "**May promote hepatobiliary functions**" could be given to **bicarbonated waters and sulfate waters** due to a low level of evidence.*

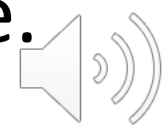
# Waters for children

**(WHO, 2005 ; Dani, 2007 ; Anses, 2014 ; Ban, 2014 ; Health canada, 2020)**

- **Water intended for children** must include the following quality parameters **instead of the criteria identified in the regulations in force** (requirements implemented in some countries).
  - **Supplements**: total **dry mineralization** less than 500 mg/L, **Sulfites** less than 0.05 mg/L, **Lead** less than 0.005 mg/L, **Iron** less than 0.3 mg/L, **Molybdenum** less than 0.07 mg/L.
  - **Microbiology**: **No pathogenic** microorganisms per 100ml.
  - **Inputs**: absence of **pesticides** (total pesticides individualized, detected and quantified**), benzyl derivatives, hydrocarbons, tetra or trichlorethylene** (within detection limits).
  - **Perchlorates**: rate less than or equal to 0.004 mg/L.

# Labelling

- **Bottled water label**: essential physicochemical composition, justified information, easily readable.
- **Physico-chemical composition of water intended for human** consumption distributed in networks must be accessible to consumers.
- Some waters can have genuine **beneficial or deleterious pharmacological effects**; these elements should be mentioned.
- **Flavoured waters and other beeverages prepared with NMW or SW**:
  - mineral **composition and** justified **mentions**,
  - **recommended nutritional intake** for the various ages of life.



# CONCLUSION

- The consumption of **packaged water** is a growing societal phenomenon.
- The **essential physicochemical composition** of all water intended for human consumption should be communicated to consumers.
- Mentions are **useful information**. They are justified for fluoride, gastric digestion, laxative effect.
- **Long-term consumption** of packaged water has to be approved by the attending physician.