

# **Rapa Whelk age reading**

by counting spawning marks

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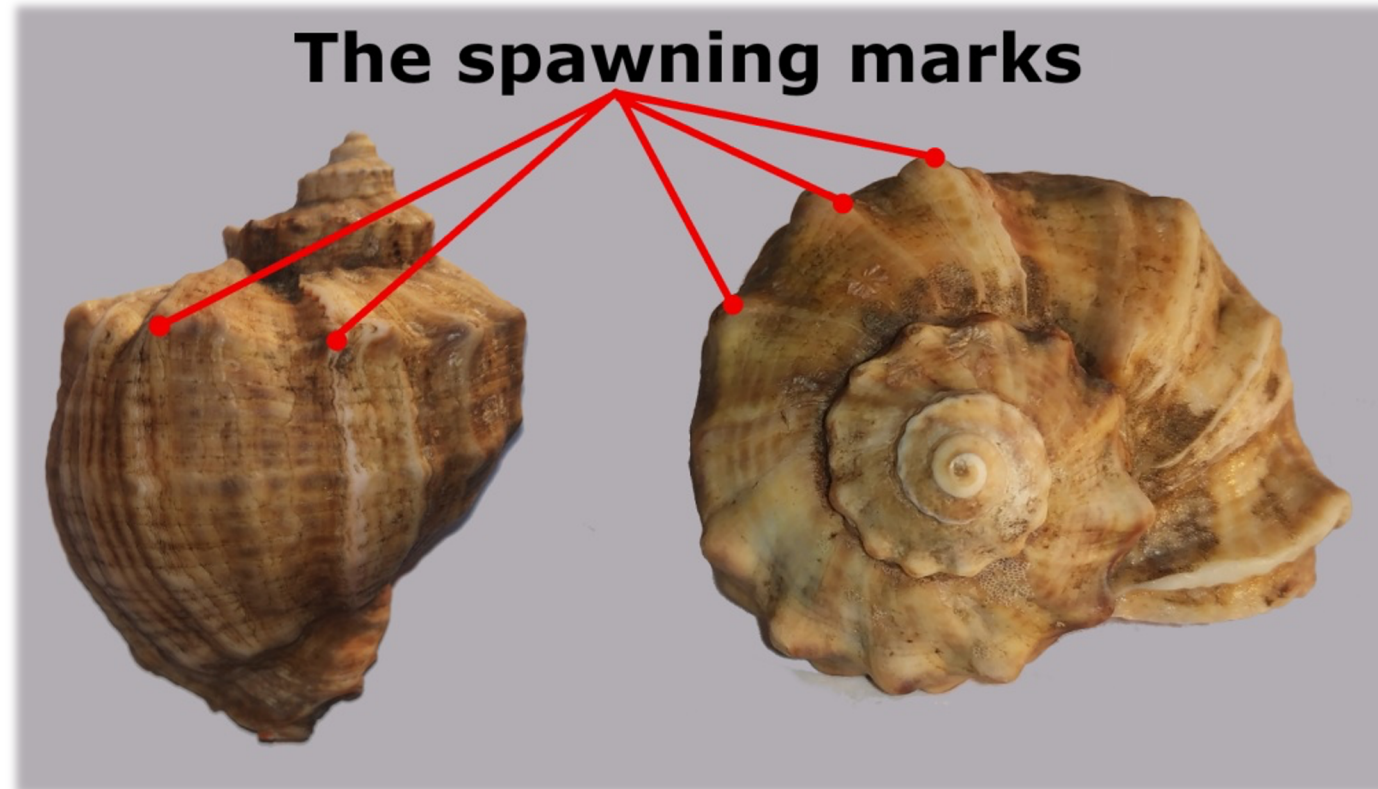
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# The age reading procedure for Rapa Whelk is based on the spawning marks counting on the surface of the shell

- A spawning mark is continuous thickening as a strip, passing on the surface of the shell.
- These marks are formed by the growth stops of the rapa whelk shell and thickening of its edges.



According to Chukhchin first spawning rapa occurs at the age of 3 years. The full age of the individual could be determined by the formula:

$$\text{Age} = (n + 2) +$$

**n - is the number of spawning marks.**



**Step № 1: Determination first spawning mark**

**Step № 2: Determination subsequent spawning marks**

**The first clearly visible thickening of the surface of the shell in the direction of growth – first mark.**

The first mark usually formed at the individuals larger than 35 mm in the third year of the life during the first spawning. Spawning marks counting should be carried out in the direction of shell's growth.



Each real spawning mark is formed due to the slowdown of growth of the rapa whelk shell and thickening of its edges. A spawning mark should be clearly visible and looks like continuous thickening as a strip, passing on the surface of the shell.

- The distance between the marks should consistently decrease to the outer edge of the shell.

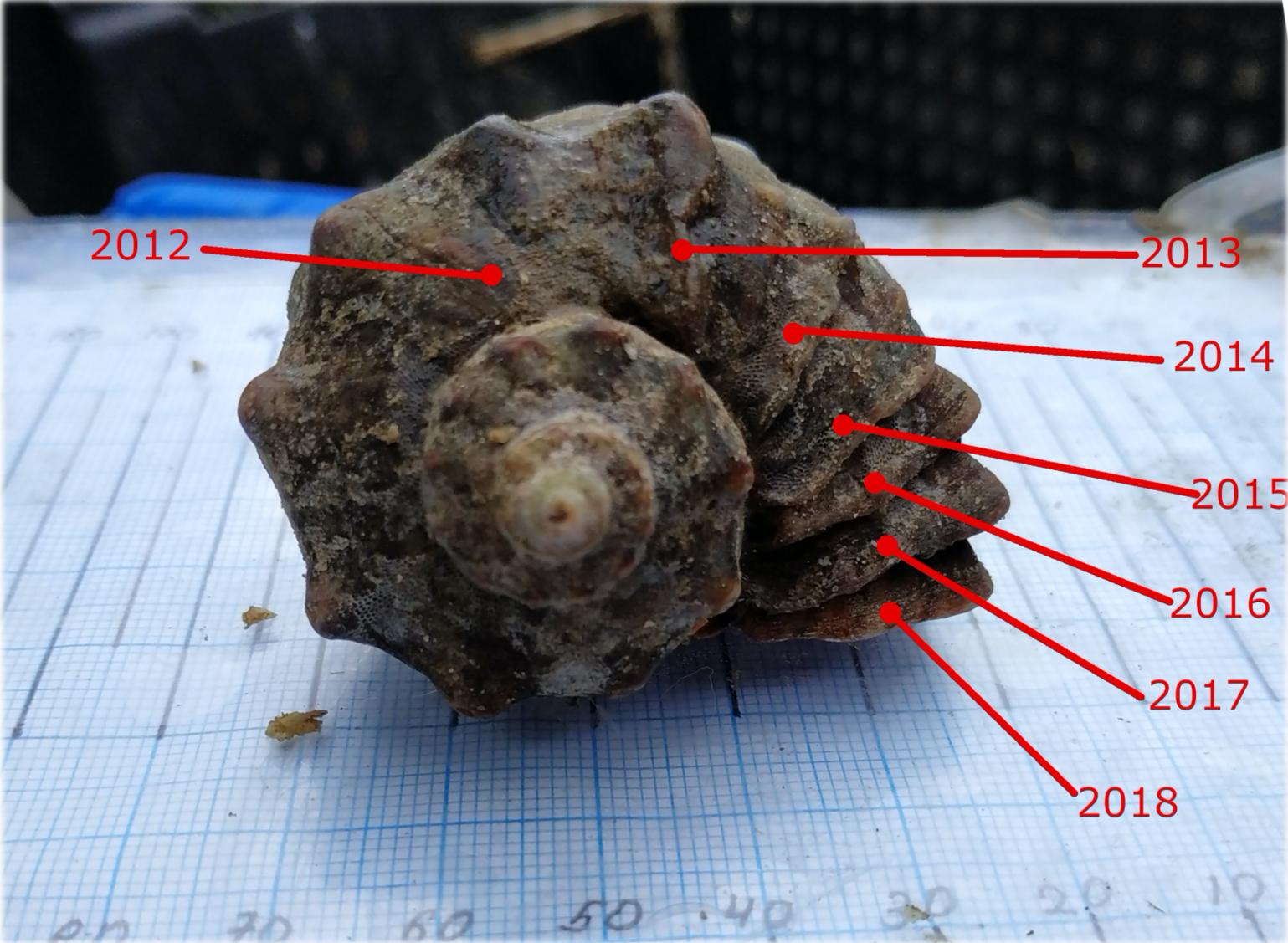


# Example

**First mark: 2012**

**Subsequent: 2013 - 2018**

**Total age: 9+**



# Types of forming the spawning marks

The edge of the shell of old individuals (older than 6 - 7 years) often begins to grow in thickness but not in length



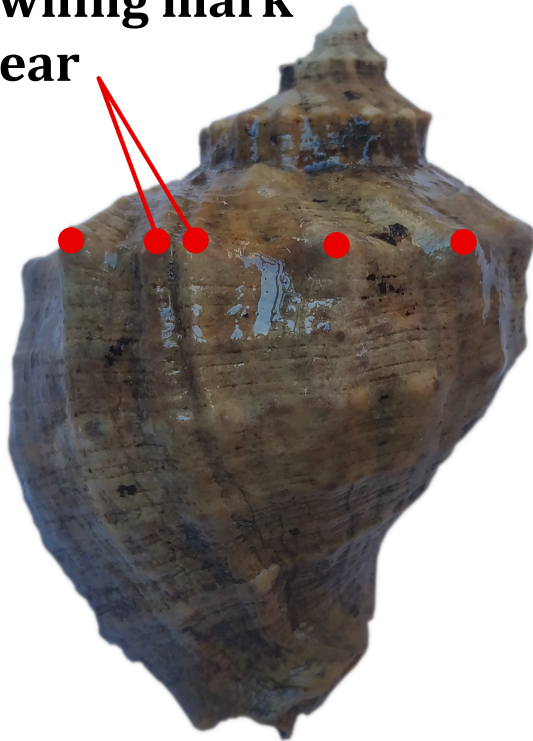
**shell with thickened edge**

**normal shell**

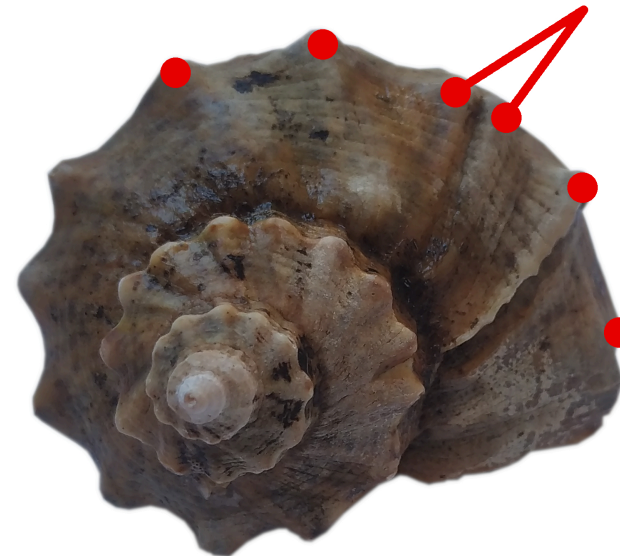
# False marks

Some spawning marks spaced very closely on the shell while the distance between two neighboring marks (earlier and later) is much higher. In this case the marks spaced very close to each other should be identified as one year mark, since the rapa could participate in spawning twice per season.

**Two spawning mark  
by one year**



**Two spawning mark  
by one year**





Some of the individuals could display larger distance between spawning marks (several times larger than the following marks). These wide area between the marks is always thinner on the shell of such individuals. In these case the orange pigmentation indicating the spawning does not exist on the inner surface, and the colour is not different from that of outer sites. As the orange colour is associated to accelerated reproductive metabolism, one possible explanation of this phenomenon, which needs to be further studied, is that, such zones may occur in the years when the individual hasn't been involved in spawning. In this case, rapa whelk feeds actively, grows fast, and has nothing thickening at shell indicating slowdown in growth. According to this assumption, such zone`s of accelerated growth should be identified as the annual marks in the case of the accelerated growth zone`s width twice more than the distance between the two previous marks on the shell.



# Preparation for analysis

Shells should be cleaned of dirt and benthic organisms (mussels, algae, sponges) with a metal brush and washed with water. A 2-5% solution of sodium hypochlorite can also be used to delete algae from the surface of the shell. The household bleach could be also applied for these purposes. Shells must be moistened with water for better visibility of the structure of their surface before age reading.

# Additional recommendations

1. Specimens taken from July to the second half of August should be excluded, since a spawning mark is being formed at the edge of the shell at this time and the mark couldn't be counted. In the case when analysis is necessary provide at this time, the outer edge of the shell can be considered as a spawning mark.
2. Some shells do not have structures on the surface or on the contrary, have a huge number of marks similar to spawning marks and should be excluded from the analysis. Up to 20% of the shells are unsuitable for analysis under normal conditions.
3. It is necessary to use a large sample for good results since the age reading method using spawning marks has some error. The minimum number of samples for age reading is 500 pcs for each country. For Turkey where differences between regions are observed, the minimum quantity for each region is 500 pcs.
4. The “+” symbol is traditionally used in all Black Sea countries, to indicate that the fish or molluscs passed its birthday i.e. 2+ means that the fish or molluscs is older than two years old by months.



**Thank you for your attention!**