



Sector of Neutron Activation Analysis and Applied
Research, Division of Nuclear Physics FLNP JINR



Neutron activation analysis of chemical elemental composition of bivalve mollusks of the South African coast

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Consortium

November 2012, Atlantic coast



- ❖ Frank Laboratory of Neutron Physics of the JINR
- ❖ Physics Dept., Saldanha Military Academy (Stellenbosch University)
- ❖ Institute for Biology of Inland Waters of the RAS

- ❖ Physics Dept., Stellenbosch University
- ❖ Nuclear Physics Department, iThemba LABS of the NRF
- ❖ Materials Research Department, iThemba LABS of the NRF



Mediterranean mussel
(*Mytilus galloprovincialis*)

Pacific oyster
(*Crassostrea gigas*)





Sample preparation

Dubna 2012





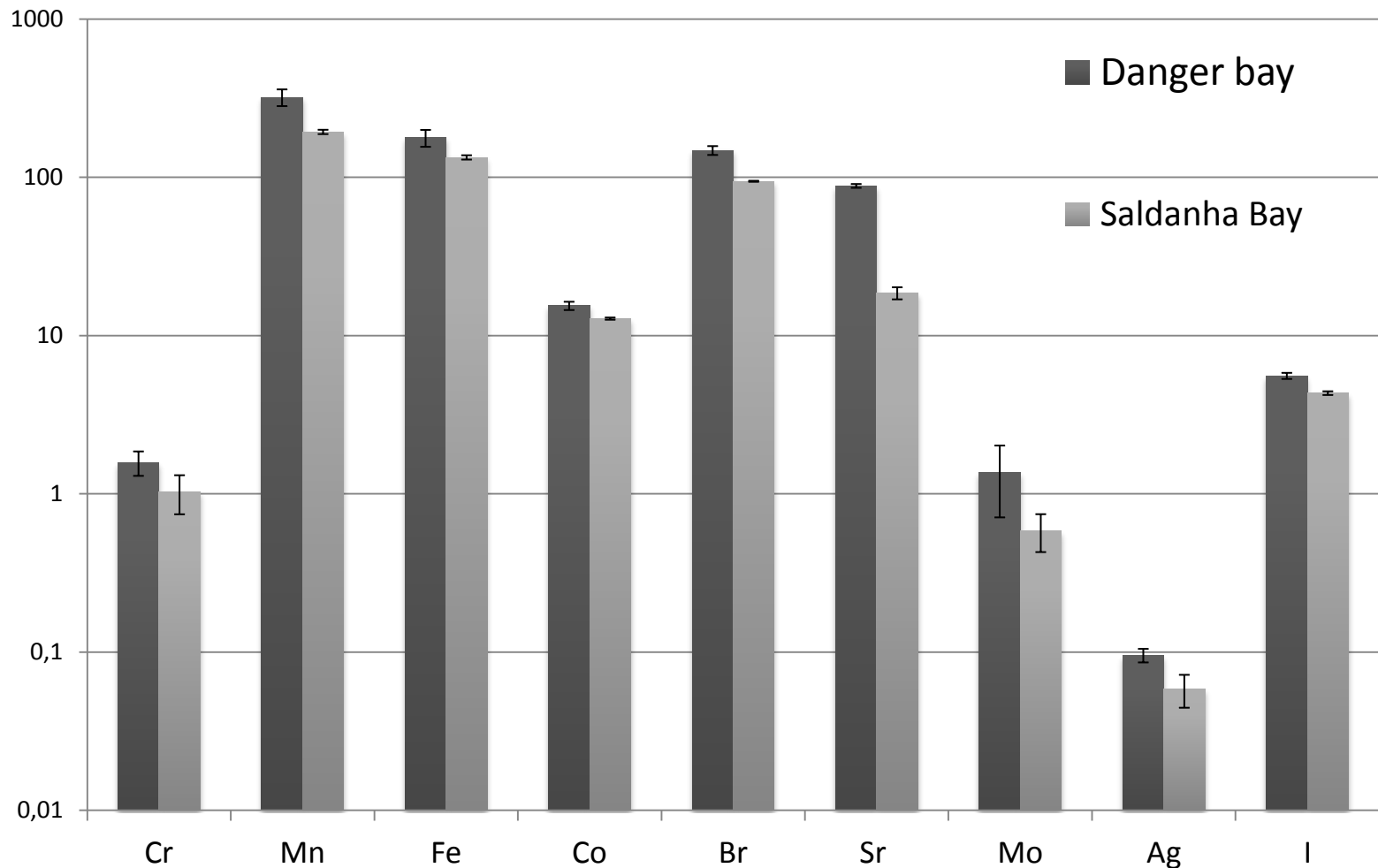
~ 300 mg of each subsample is taken for NAA



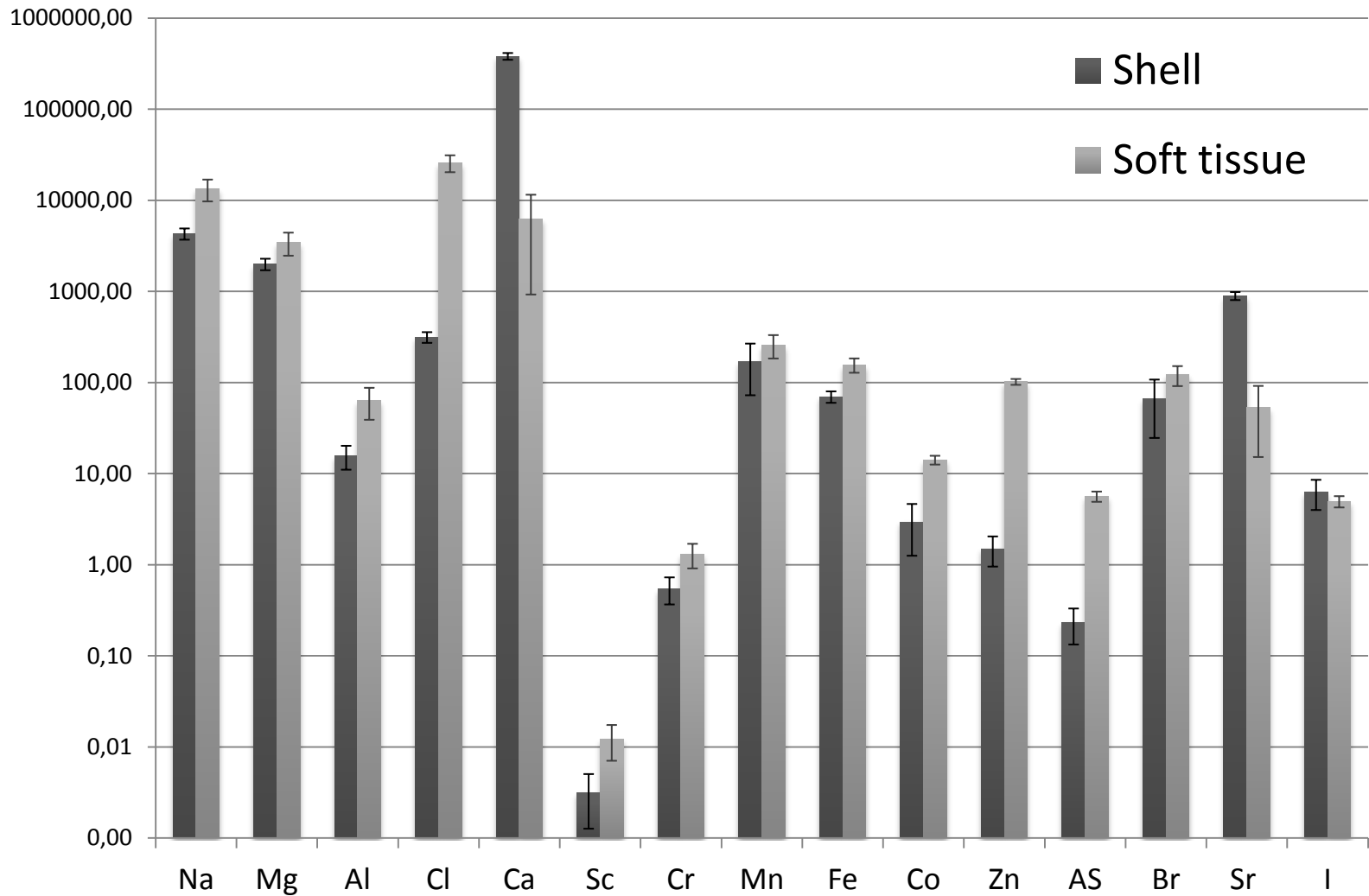
NAA at reactor IBR-2

| H | 37 elements | | | | | | | | | | | | | | | | He |
|----|-------------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Li | Be | | | | | | | | | | | B | C | N | O | F | Ne |
| Na | Mg | | | | | | | | | | | Al | Si | P | S | Cl | Ar |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe |
| Cs | Ba | La* | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
| Fr | Ra | Ac** | | | | | | | | | | | Rf | Db | Sg | Bh | Hs |
| | * | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | | |
| | ** | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lw | | |

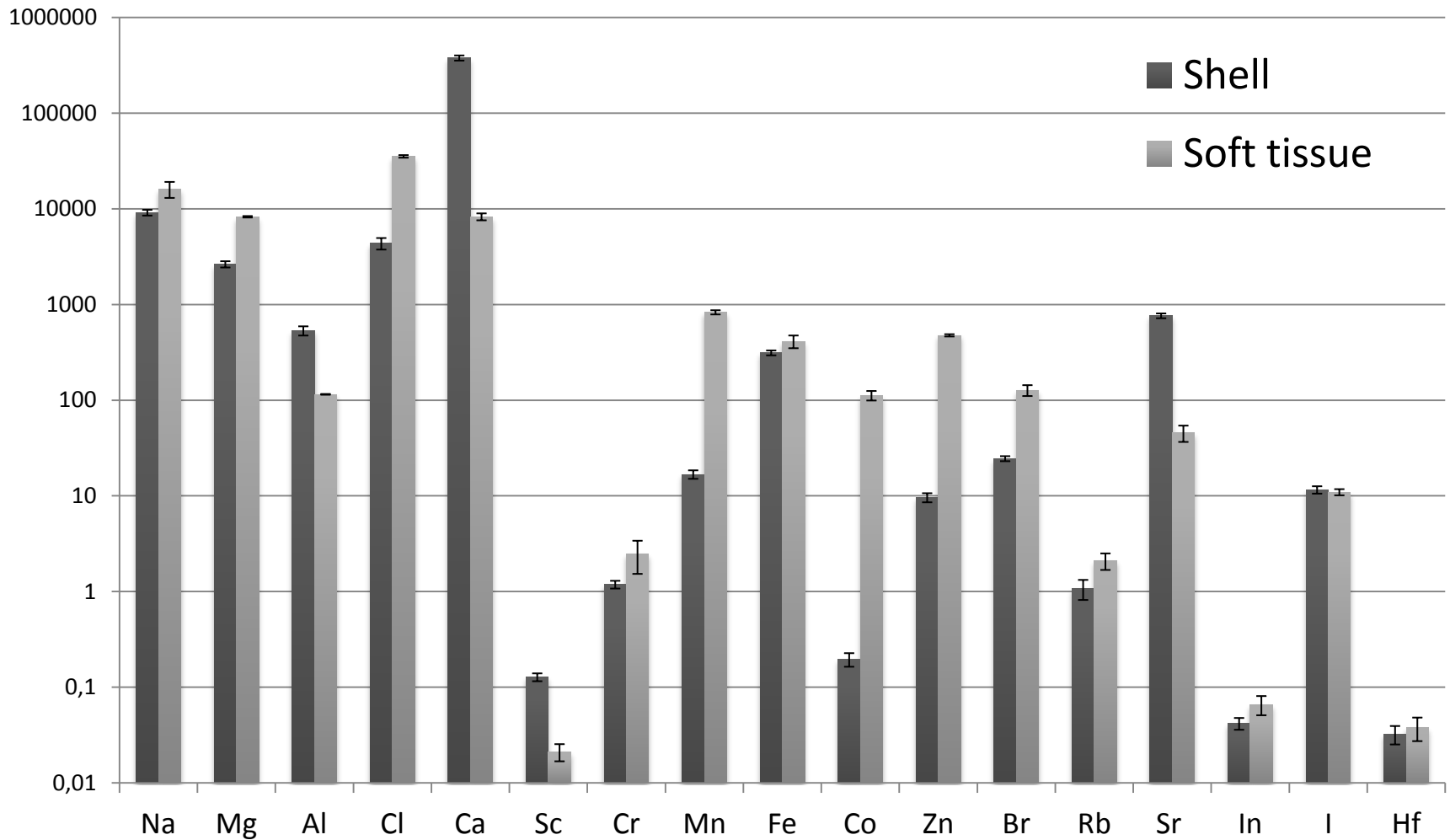
Element contents in Mediterranean mussel's soft tissue from Saldanha Bay and Danger Bay



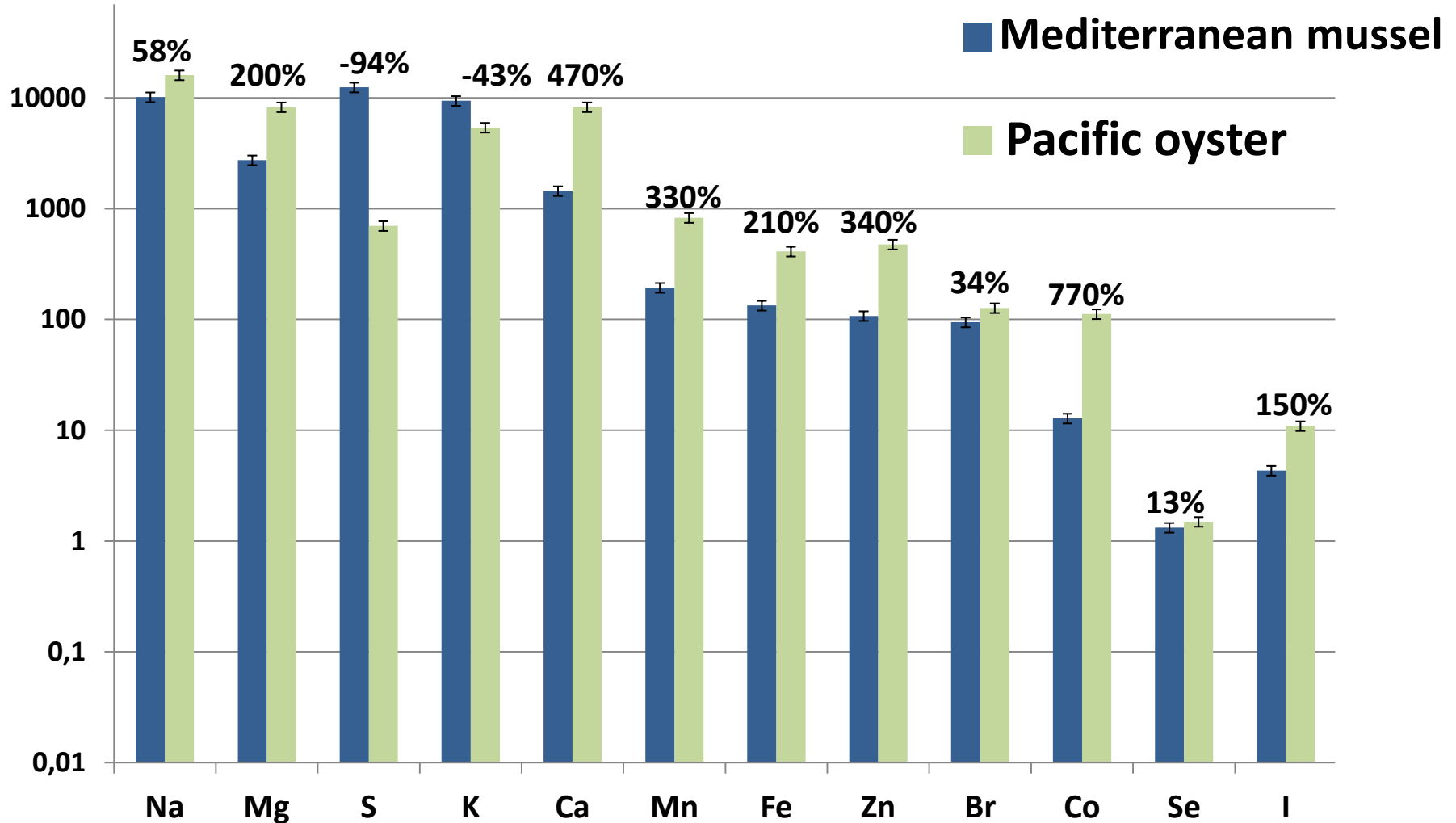
Element contents in Mediterranean mussel's shell and soft tissue



Element contents in Pacific oyster's shell and soft tissue



Elements distribution in the mollusk soft tissues



Conclusions

- ❖ Both Pacific oysters and Mediterranean mussels accumulate considerable amounts of trace elements
- ❖ The contents of the majority of elements in the soft tissues of both species are higher than in the shells
- ❖ The tissues of wild invasive Mediterranean mussels contain higher levels of a range of trace elements comparing to farmed mussels
- ❖ The tissues of Pacific oysters contain much higher levels of almost all analyzed elements comparing to the tissues of black mussels

Thank you for attention!

