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**Studies of Polycyclic Aromatic Hydrocarbons and Trace Metal Contaminants in Some
Selected Seafood from the Coastal Waters of Ghana**

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ABSTRACT

A total of 54 individuals species comprising of 18 each of *Pomadasys peroteti*, *Cynoglossus senegalensis* and *Drapane africana* were selected from the coastal waters of Ghana were analyzed quantitatively for trace metals and polycyclic aromatic hydrocarbons (PAHs). Ten (10) different metals: As, Mn, Cr, Pb, Ni, Fe, V, Co, Cu and Zn were detected by the inductively coupled plasma atomic emission spectrometry (ICP-AES) at the quality control laboratory of the Tema oil refinery. The biochemically essential trace metals Cu, Fe, Ni, V, Zn, and Co were detected in all analyzed samples at relatively high concentrations than toxic non-essential metals (As and Pb). Co recorded the highest concentration of $142.21 \pm 6.16 \mu\text{g/g}$ dry weight in *P. peroteti* from Takoradi. The total mean concentrations across sites showed that Takoradi recorded the highest amount of trace metals, followed by Elmina then Tema at 593.88, 264.48 and $224.26 \mu\text{g/g}$ dry weight respectively. However, *C. senegalensis* accumulated the highest level of trace metal contaminants, followed by *P. peroteti*, then *D. africana* at 399.89, 370.76, and $311.97 \mu\text{g/g}$ dry weight respectively. A comparison of the mean concentrations obtained in this study with results from some other studies in Ghana, Africa and WHO limits showed that the values obtained for the individual trace metals in all seafoods analyzed fell below WHO limits, however, iron recorded relatively higher amount than in previous studies conducted in the country. The calculated THQs showed that there are no risks involved in the consumption of seafoods. The species were also analyzed for PAHs using gas chromatography/flame ionization detector at the quality control laboratory of the Tema Oil Refinery. A total of 12 different PAHs comprising of five (5) known human carcinogenic PAHs: B[a]A, B[b]F, B[k]F, IP, CHY and seven (7) non-carcinogenic PAHs: FLU, FL, PHE, PY, ACE, AN and CYP were detected in the samples. B[a]P was not detected in all seafoods analyzed. BaA and BkF were detected in all seafood samples at relatively high concentrations ranging from 0.249 ± 0.021 to $16.99 \pm 9.537 \mu\text{g/g}$ dry weight and 0.019 ± 0.011 to $2.58 \pm 0.1 \mu\text{g/g}$ dry weight respectively whereas CHY and IP were poorly detected at very low concentrations ranging

from below 0.000 to 0.055 ± 0.032 g/g dry weight to 0.01 ± 0.006 g/g dry weight respectively. The total number of high molecular weight PAHs assemblages was higher than low molecular weight PARs. The LMW-PAH/HMW-PAH ratios in all species from the three sites were <1 : 0.5-0.67 in *D. africana*, 0.5-0.6 in *C. senegalensis* and 0.5-0.67 in *P. peroteti*. Also, BaA/(BaA + CHY) ratios were calculated to be 0.98-1 in *D. africana* and 1.0 for both *C. senegalensis* and *P. peroteti*. The lowest BaA/(BaA + CRY) ratios occurred in *D. africana* from Takoradi and Tema. However, the BaA/(BaA + CRY) ratios in all the species were > 0.35 , suggesting pyrogenic sources of the PAHs evaluated in the samples. Concentrations of the PARs did not vary significantly ($p < 0.05$) across sites and among species, thus, the ability to accumulate PAHs did not vary with each species and their locations. The total concentrations of the PAHs ranged from 1.245 to 21.042, 1.260 to 5.16 and 1.582 to 3.046 g/g dry weight in *D. africana*, *C. senegalensis* and *P. peroteti* respectively. Additionally, the PEC values ranged from 0.543 to 8.941 in *D. africana*, 0.535 to 2.193 in *C. senegalensis* and 1.295 to 1.582 in *P. peroteti*. The SV for PAHs in the seafood analyzed was calculated to be 0.0012, indicating that the seafoods were not safe for consumption with respect to PAHs accumulations.

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