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OMNI-Net Ukraine  
Child Development Programs  
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***POLISSIA***

**New Initiative and Call for Participation**

*Proposal for investigations of elevated neural malformations and other anomalies among Polischuks, a natural population cohort severely impacted by Chornobyl ionizing radiation and with characteristics of a population isolate.*

**Ongoing Main Projects**

*Monitoring of Population Malformation Rates in Three Oblast of Ukraine  
Fetal Alcohol Spectrum Developmental Disorders*

*Clusters of conjoined twins*

*(Complete listing available upon request to - [omninet@gmail.com](mailto:omninet@gmail.com))*

# ***Polissia Initiative***

## ***Background and Invitation to Scholars***

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### **Preface**

***Polissia*** is a large region of Ukraine inhabited by ***Polishchuks***.

***Polishchuks*** represent *a natural human population cohort with characteristics of a population isolate*.

In Ukraine, Polissia and Polishchuks are the region and human population ***most severely impacted by Chornobyl***. Here the emphasis is on the Polissia area of the Rivne province (Rivne-Polissia).

The ***Polissia initiative*** stems from observations of persistently elevated ***neural malformations*** population rates in Rivne-Polissia. Known causes of the observed elevated rates of microcephaly-microphthalmia include ionizing radiation (IR) as well as other risk factors. We believe the observations summarized in this overview are sufficiently compelling to warrant investigations of ***Chornobyl*** disaster effects on the long term ***health and reproductive risks*** in Polissia – issues that are also relevant to those who are impacted by the ***Fukushima*** disaster in Japan.

***An invitation is extended to national and international scholars and graduate students to join the Polissia Initiative and participate in prospective investigations or propose their own. Scholars and investigators unable to engage in investigations but who are interested in Polissia and the Polishchuks population are encouraged to join as advisors and consultants.***

## Introduction

**OMNI-Net is dedicated to** the study, amelioration and prevention of developmental disorders. **OMNI-Net is** a not-for-profit international organization registered in Kyiv, Ukraine. Since 2000, OMNI-Net teams conduct population monitoring of malformation rates in three Ukrainian provinces or oblast (Volyn, Rivne, and Khmelnytsky). OMNI-Net is a member and reports malformation rates in Ukraine to Eurocat (a population-based registers for the epidemiological surveillance of congenital anomalies covering 1.5 million births in 20 countries – [www.eurocat-network.eu](http://www.eurocat-network.eu)) and ICBD (International Clearinghouse for Birth defects – [www.icbdsr.org](http://www.icbdsr.org)). Reports of implementations, initiatives and publications are found at our web-site IBIS (International Birth Defectes Information systems – [www.ibis-birthdefectes.org](http://www.ibis-birthdefectes.org)). For further information, please contact W. Wertelecki, M.D. ([werteleckiomni@gmail.com](mailto:werteleckiomni@gmail.com)).

**This overview consists of five parts**; Some Facts; OMNI-Net Consortium; Some Key Reports: Photo-Gallery; Epilogue; and Explanatory Notes (n.b.). Names and spellings are given in Ukrainian, e.g. Chornobyl - alternative names and spellings are given in an explanatory note (see n.b. 1).

## Overview

### I. Some facts and highlights

**Polissia is the largest region of wetlands, marshes and forested lowlands in Europe, it is also known as the Prypiat River Marshlands.** The Prypiat river floodplain extends from the Ukrainian-Polish frontier some 250 miles eastward toward its confluence with the Dniipro (Dnieper in Russian). The Chornobyl (Chernobyl in Russian) disaster occurred 1986 and the site of the nuclear power plants and the adjoining “atom”-city of Prypiat is near the confluence of these rivers, some 60 miles north of Kyiv. **The Polissia soils, rich in sand and clay enhance the index of  $^{137}\text{Cs}$  transfer from soil to the food chain.** The isolation and life-style of Polishchuks is further illustrated in following sections.



*Prypiat Marshes*

Note that since 1986, **virtually all pregnant Polissia women are exposed to low levels of ionizing radiation (IR)**. Most infants currently being born in Polissia are the offspring of IR exposed parents – these **infants are the product of gametes and developed in an environment impacted by IR**. This cohort of Polissia infants is unique and as shown in Table 1 rather large, thus of considerable importance for investigations of long term health effects of IR.

**Table 1. Population and Births in Rivne Oblast**

Data Source	Population	Births		
	2001*	2001	2009	
			N	Growth (%)
Polissia	476,848	6601	8350	26
Not Polissia	697,826	6521	8934	37
All	1,174,674	13,122 (a)	17,284 (a)	32
Official Registry		13,311 (b)	17,643 (b)	33
OMNI Registry		13,253 (c)	17,544 (c)	32

\* *Ukrainian census data*

(a) *Excludes non-residents (OMNI-Net population registry of neonates)*

(b) *Deliveries by Rivne residents anywhere in Ukraine*

(c) *Live births by Rivne residents anywhere in Ukraine*

Every raion (county) in Rivne, classified as a **Chornobyl impacted zone** is found in the **Rivne-Polissia** region. (see n.b. 3) Further highlights regarding the ecology and ionizing radiation (IR) pollution of Polissia and characteristics of its population, or **Polishchuks**, as a natural cohort are found in an explanatory note (see n.b.2)

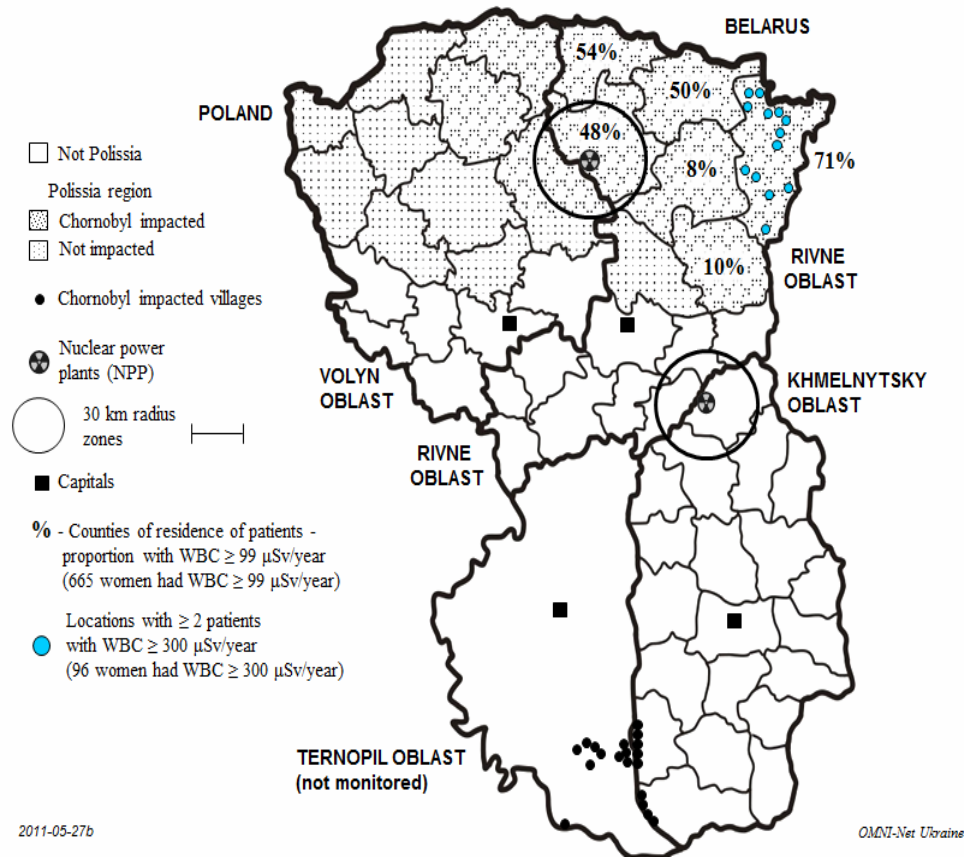
Among **factors that modulate IR impacts on health** in Rivne-Polissia, at least four deserve particular attention: first, the much **higher sensitivity of gonadal, embryonic and fetal cells** to IR damage – most Polissia pregnant women of today were exposed to IR since their own conception – Rivne-Polissia was ignored by the USSR and declared a Chornobyl impacted zone only after the independence of Ukraine in 1991, five years after the explosion in Chornobyl; second, because Polissia soils are poor in humus and potassium they increase the transfer of  $^{137}\text{Cs}$  to plants; third, the life-necessities of Polishchuks (poverty of soils and lack of access to  $^{137}\text{Cs}$  free food supplies and potable water) **prompts the ingestion** of radionuclides; and forth, **inhalation of radionuclides** in smoke related to a reliance on wood burning for cooking and heating, forest fires and burning of biomass after harvests – the impact of inhaling radionuclides and its greater potential to harm health has not been sufficiently emphasized.



The wetlands of Polissia **OFTEN** require that beehives be placed high on trees.

Deserving mention is the presence of **two Chornobyl-like nuclear power plants**, one in Rivne-Polissia and another adjoining the southern edge of Rivne oblast. (see map below). These installations are akin to the 1970 nuclear plant and atom-city complex, once called V. I. Lenin and renamed as Chornobyl. The Chornobyl complex arose near the river Prypiat, located 100 km north from the capital of Ukraine, Kyiv and 200 km east from Rivne-Polissia. In 1973, in western Polissia, arose the Kuznetsovks complex (a Chornobyl-like atomic power plant with an adjoining “atom-city” – see n.b. 3), 85 km north from the capital of Rivne. Some 45 km south from Rivne city, also in 1973, arose the Khmelnytsky-Netishin atomic power plant-atom-city complex. (Ostroh city in Rivne and Netishin atom-city located across the provincial border, in Khmelnytsky oblast, are virtually adjoining). The highest rates of neural tube malformations are registered in Kuznetsovks and Ostroh, but the number of observations is small as are the number of births in these atom-city complexes. As shown in the map below, the whole body counts (WBC) of  $^{137}\text{Cs}$  in pregnant women in Rivne are relatively low (there are regions in the world with natural ionizing radiation levels similar or higher than those shown here). It is worth noting, however, that the highest WBC among pregnant women in Rivne are found among those residing in one north-east county (Rokyne) in Rivne-Polissia.

### <sup>137</sup>Cs – Whole Body Counts (WBC) of 3864 Rivne Pregnant Women



For millennia, the nature of the Prypiat Marshes *isolated Polishchuks* from other populations which was conducive for the development of a culture with characteristics of a **population isolate** having a particular dialect, folklore and a reliance on self-sufficiency (for a brief historic overview, see n.b. 3). One common feature among isolated populations are characteristic family surnames and an elevated isonymy index (proportion of shared surnames in a population). Polishchuk not only denotes a population in Ukraine, it also is a frequent family surname. Below is a table illustrating isonymy levels in diverse areas of Rivne oblast. In the Table 2 below are shown two types of isonymy computations; the first column shows the percent of newborns with any of the five most common surnames in the area; the second column shows how many of the most common surnames in the area are given to 5% of newborns.

**Table 2. Isonomy levels in Rivne Oblast (Province).**

Area	Births	Isonomy	
		%	N
Capital city (Rivne)	26636	3.12	11
Rivne raion	10291	2.94	11
<b>RAIONS (COUNTIES)</b>			
<b>POLISSIA</b>			
<b>Distant</b>	21508		
Zarichne	5019	15.36	1
Rokytne	10171	13.74	2
Dubrovytsia	6318	7.93	3
<b>Less-Distant</b>	45913		
Volodymyrets	10677	7.02	4
Berezne	10819	6.83	4
Sarny	16473	5.49	5
Kostopil	7944	4.62	6
<b>NON-POLISSIA</b>			
<b>Northern Counties</b>	13518		
Demydivka	1664	6.97	3
Korets	3827	5.88	6
Mlyniv	4202	5.57	6
Hoshcha	3825	4.68	6
<b>Southern Counties</b>	23043		
Radyvyliv	4260	5.31	6
Ostroh	4126	4.46	6
Dubno	8707	4.25	7
Zdolbuniv	5950	3.61	8

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## II. OMNI-Net Consortium

OMNI-Net, is a *not-for-profit international organization registered in Ukraine* – the resources for operations are contributed by provincial health care programs and by international cooperative projects implemented at various sites in Ukraine. OMNI-Net centers are located in major Provincial health care facilities. OMNI-Net team members are members of their respective *provincial health care systems*. A fuller report on OMNI-Net is available upon request and is posted on our websites (<http://ibis-birthdefects.org/start/uabdp.htm>).

One of the *main goals of OMNI-Net* is to sustain *two ongoing population registries*, - a registry of all *neonates and* another of all *malformed infants*, both established in 2000. To ensure that Ukrainian data could be compared to that collected in other countries, *international standards* were adopted. Malformation population rates in Ukraine are reported by OMNI-Net to Eurocat (European consortium of 38 malformation surveillance systems) and to the International Clearinghouse for Birth Defects Surveillance and Research (ICBDSR). Following a probationary period, OMNI-Net is now a full member of these organizations. The population registry of newborns and other medical-care databases allow OMNI-Net to create, with relative ease, ad-hoc population cohorts for investigations. Further description of the OMNI-Net activities are given in *four foundation reports* published in international scientific journals and briefly summarized next.

**“Birth defects surveillance in Ukraine: a process”** - Wladimir Wertelecki et OMNI-Net work group - J Appl Genet 47, 2006, 143-149) – a summary of the process of forming the OMNI-Net and its engagement with *national and international* partners and advisors. The map above shows the counties of Rivne oblast being monitored for malformations – counties shaded gray represent Polissia soils and in darger gray those officially designated as “Chornobyl zones”.

**“Chronic Ionizing Radiation (IR) Exposure in the Rivne-Polissia Region of Ukraine: Implications for Birth Defects”** Kelsey Needham Dancause<sup>1</sup>; Lyubov Yevtushok<sup>2</sup>; Serhiy Lapchenko<sup>3</sup>; Ihor Shumlyansky<sup>2</sup>; Genadiy Shevchenko<sup>4</sup>; Wladimir Wertelecki<sup>5</sup>; Ralph M. Garruto<sup>1</sup> in *Am J Human Biol* 22, 2010, 667-674 - presents data and interpretations of information provided by pregnant women living in Rivne-Polissia. An analysis of the data suggests that IR in this region were under-estimated. The data also suggests that exposure by inhalation is another factor that has not been sufficiently stressed in the past. Our analysis also shows that most Rivne-Polissia individuals consume **diets that contribute <sup>137</sup>Cs above the “permissible” levels** set by the authorities. (see Table 3.)

**Table 3. Estimated <sup>137</sup>Cs Exposure through Diet in Rivne-Polissia**

Food Type	Mean <sup>137</sup> Cs Level in Polissia (Bq/kg)	Daily Intake (kg)	Mean Daily <sup>137</sup> Cs intake in Polissia (Bq)	MOH 1997 Accepted <sup>137</sup> Cs Levels (Bq)
Milk and Milk products	113.88	1.02	116.38	100.00
Meat <sup>1</sup>	84.45	0.19	15.71	200.00
Potatoes	31.76	0.36	11.40	60.00
Vegetables	15.71	0.28	4.38	40.00
Fruits <sup>2</sup>	5.73	0.13	2.21	70.00
Mushrooms <sup>3</sup>	13875.00	0.01	87.37	2.30
Berries <sup>3</sup>	2200.00	0.01	30.80	500.00
<b>Estimated Dietary Intake</b>			<b>268.25</b>	
<b>Accepted MOH 1997 Levels</b>			<b>210.0</b>	

<sup>1</sup>Mean <sup>137</sup>Cs level is based on estimates for pork, which was the main meat consumed. Beef is estimated to have a much higher <sup>137</sup>Cs level (301.6 Bq/kg)

<sup>2</sup>Mean <sup>137</sup>Cs level is based on estimates for apples, which was the main fruit consumed

<sup>3</sup>Mean <sup>137</sup>Cs levels based on estimates from Karachov 2006, corrected for half-life reduction since 1999

**“Malformations in a Chornobyl-Impacted Region”** - Wladimir Wertelecki et OMNI-Net work group - *Pediatrics* 125, 2010, e836-e843 – report of high population **rates of neural tube defects** (anencephaly, spina bifida and other related malformations) in Rivne oblast, among the **highest in Europe**. We also note and excess of births of **conjoined twins** and that the rates of **microcephaly, microphthalmia** and **teratomas** are also elevated although the number of observations is small. Most importantly, we note that the rates of these malformations are significantly **more frequent in Rivne-Polissia** compared to Rivne-nonPolissia. An update of the above report is given next.



**“Neural Malformations in a Choronyl Impacted Region of Ukraine”** - Lyubov Yevtushok, Wladimir Wertelecki et OMNI-Net work group - 2011, under review - expanded analysis by nearly 150,000 births of which 65,000 births occurred in Rivne-Polissia (see table below). The results confirm previous results and more firmly point out that in **Rivne-Polissia**, the rates of neural malformation are the highest in Europe. (Table 4.) This study also suggests that the cause may be a combination of **synergistic and additive risk factors** including **IR, alcohol and dietary deficiencies** among others. The data is compelling and justifies, in our view, a Rivne-Polissia initiative to further elucidate the causes and effects that impact prenatal and postnatal human development and health in this region.

**Table 4. Neural Malformations in Europe and in Rivne province, Ukraine**

	Births	NTD*	Microcephaly	Microphthalmia
EUROPE <sup>a</sup>	6392138	5860 (9.2)	1280 (2.0)	486 (0.8)
RIVNE <sup>b</sup>	145437	303 (20.8)	42 (2.9)	27 (1.9) <sup>c</sup>
Non-Polissia <sup>d</sup>	80976	138 (17.0)	12 (1.5)	9 (1.1)
Polissia <sup>e</sup>	64461	165 (25.6)	30 (4.7)	18 (2.8) <sup>c</sup>

\* NTD: neural tube defects

<sup>a</sup> Rates per 10,000 births (live and stillbirths) calculated from 2000-2008 data reported by 31 registries (Styria, Antwerp, Hainaut, Zagreb, Odense, Paris, Strasbourg, Saxony-Anhalt, Hungary, Cork and Kerry, Dublin, SE Ireland, Campania, Emilia Romagna, North East Italy, Sicily, Tuscany, N Netherlands, Norway, Wielkopolska, S Portugal, Barcelona, Basque Country, Vaud, East Midlands and Yorkshire, NW Thames, Northern England, South West England, Thames Valley, Wales, Wessex).

<sup>b</sup> Rate per 10,000 live births in Rivne from 2000 to 2009.

<sup>c</sup> Excludes three instances of microphthalmia, one in combination with NTD and two in combination with microcephaly

<sup>d</sup> Chernobyl not impacted

<sup>e</sup> Chernobyl impacted

A full report of OMNI-Net reports and publications is posted on the IBIS site: <http://ibis-birthdefects.org/start/pdf/omnireport.pdf>.

### III. Some Key Reports

#### IIIa. Radiation dosimetry

**“Internal Exposure from the Ingestion of Foods Contaminated by 137 Cs after the Chernobyl Accident – Report 2. Ingestion Doses of the Rural Population of Ukraine up to 12 y. after the Accident (1986-1997)”**. I. A. Likhtarev, L. N Kovgan, S.E. Vavilov, et al. in *Health Phys.* 79, 341-357, 2000. ) The investigators indicate that **internal IR doses** calculated for various regions in Ukraine were **not based on actual measurements** of body IR of individuals but are **based on theoretical extrapolations** mostly from reports of averages of consumption of milk and potatoes contaminated in diverse degrees by radioactivity. Regarding “rural” infants consumption of milk, it was estimated from oral reports gathered from only 198 parents of infants living in Zhytomyr oblast. **No consideration was given to Polissia** where the consumption of contaminated mushrooms and berries and burning of contaminated wood, potato stems and other vegetative matter, are extensive. (see next comment).

**“Chernobyl - Consequences of the catastrophe for People and the Environment”** A. V. Yablokov, V. B. Nesterenko, A. V. Nesterenko in *New York Academy of Sciences Monograph*,

2009, page VIII. In the introduction by Professor M. Grodzinsky, member of the Ukrainian National Academy of Sciences and Chairman of the Ukrainian National Commission on Radiation Protection, he states that “ ... this publication is the largest and most complete collection of data concerning the negative consequences of Chernobyl impacts... decisions to calculate dose only on the scale of Cs-137 ionizing radiation (IR) led to **obvious underestimation of doses** (n.b. doses were defined on the basis of the activity in milk and potatoes but no consideration were made that in Polissia the consumption of these edibles is much greater than elsewhere in the country and further enhanced by high consumption of wild mushrooms and berries along with other forest products which also were not considered).

### IIIb. Ionizing Radiation (IR) in Rivne-Polissia

**“Influence of various factors on individual ionizing radiation (IR) exposures from the Chernobyl disaster”** P. Zamostian, K.B. Moysich, M.C. Mahoney et al. in *Environmental Health* 1: 4, 1-8, doi 10:1186/1476-069X-1-4 The authors **focus on** the Ukrainian Polissia region (and in particular **Rivne-Polissia**) because; this region is the **most affected by Chornobyl**; Polissia territories are known for their great variation in environmental and geographic conditions and therefore agricultural patterns; soils have **the highest values of soil-to-milk transfer coefficients**; residents live in small villages surrounded by forests and rely as main food sources on “free wild foods” (mostly mushrooms, berries and fish) which are known to readily concentrate radioactive elements; “ ... **after 1992-1994 there was a rapid increase of internal IR** exposure levels and that from 1996-2000 there was **no discernable pattern of decreasing internal IR levels ...**” the authors speculate that a plausible explanation for the increase in internal IR levels relates to severe economic strains and cessation of government sponsored counter-measures (provision of “clean” dietary staples) leading to a reversion to traditional diets; people were forced to once again to consume more local produced foods and rely more on “free natural foods from forests, streams and lakes”. Our own investigations are consistent with the views expressed in this report.

### IIIc. Health Impacts

**“Indices of neuro-oncological morbidity dynamics among younger children in Ukraine”** Y.A. Orlov and A. V. Shaversky in *Int. J. Rad. Med* 2004, 6; 72-77. “ ... The frequency of childhood brain tumors has risen in the period 1986-2002 compared to the period 1981-1985. It is well known that IR impacts particularly the nervous system. This report suggests also suggests that monitoring of brain tumors should be a component of the “ Polissia Initiative”.

**“Chernobyl’s subclinical legacy: Prenatal exposure to radioactive fallout and school outcomes in Sweden”** D. Almond, L. Edlund and M. Palme in *Q. J. Economics* 2009; 124; 1729-1772 From a study of 562,637 Swedes born in the mid-1980’s, the **cohort in utero during the Chernobyl accident had worse school outcomes** than adjacent birth cohorts. The school performance deterioration was largest for those at weeks 8-25 of gestation, when neural development is most rapid. These results demonstrate that damage to cognitive ability likely occurs at IR levels previously considered safe. In Sweden, the Chornobyl radioactive fallout was estimated at below 3 mSv. This report provides further evidence of Chornobyl impacts on the nervous system impacts detected as sub-clinical effects in lands quite distant from the Chornobyl site.

**“Children Affected by the Chernobyl Nuclear Incident”** E.R. Svedsen, I.E. Kolpakov, Y.I. Stepanova et al. in *Environ Health Perspect* 188:720-725, 2010. Doi:10.1289/ehp.0901412 - The

investigators found significant low airway obstruction and restriction in children chronically exposed to low-dose radioactive contaminants such as those found downwind of the Chernobyl Nuclear Power Plant. Impacts of IR-bearing smoke and dust on the **respiratory system of children**, points toward an important question for investigation.

### III.d. Impacts on other species

*“Chernobyl Birds have Smaller Brains” A.P Mooler, A Bonisoli-Alquati, G Rudolfsen and T.A. Mousseau PLoS ONE 2011, 6, e16862* This important investigation points out that **low doses IR can have significant effects on normal brain development** (note similar impacts on Swedish children reported by Almond et al. cited above).

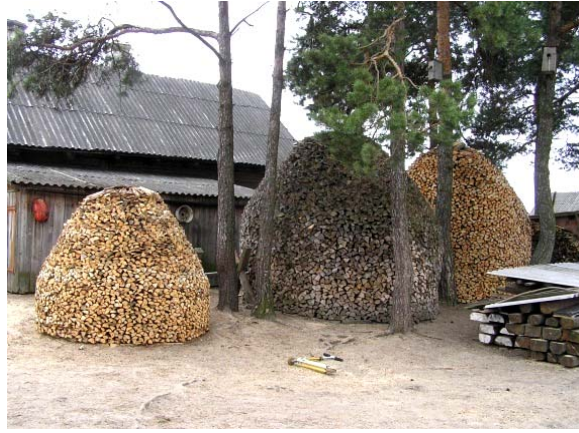
*“Malformations in Lambs” in Health Effects of Chernobyl per an Affiliate of International Physicians for the Prevention of Nuclear War, cited in page 42, as reference 115, Publisher IPPNW, Kortestrasse 10, 10967, Berlin, Germany.* Investigations by Dr. J. Steinbach from the Department of Animal Husbandry and Genetics of Domestic Animals at the University of Giessen noted that following the Chornobyl disaster, the **frequency of malformations and deaths in lambs increased**. Investigation of malformation rates among domestic animals in Rivne-Polissia are under consideration.

## IV. Photo-Gallery

The following images illustrate three points: first, Polishchuk’s self-sufficiency and reliance on Polissia’s natural resources (**water, fish, wood, forest-foods, home produced edibles**) all of which are **polluted by <sup>137</sup>Cs**; second, internal IR not only reflects **ingestion** (diet and water) but also **inhalation** (mostly of smoke from burning forests, biomass after harvests and reliance on burning turf and wood for heating and cooking); and third, the photographs that follow illustrate the importance of **partners of the Polissia Initiative** – the images were contributed by Mr. O. Nahorniuk, M.S. an ethnographer specializing on Rivne-Polissia culture and who is a member of the **Rivne Ethnology Museum**.



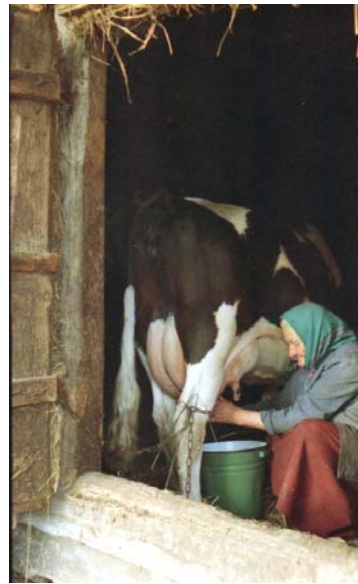
*High reliance on **fishing** in  $^{137}\text{Cs}$  polluted waters and on potable water from **shallow wells** is prevalent.*



*Reliance on  $^{137}\text{Cs}$  containing **wood burning** for heating and cooking conducive toward the **inhalation of smoke and IR** – wood ashes often are used to fertilize **home-gardens**.*



After potato harvest, **burning** of dried stems – **Inhalation** of radioactive smoke



High consumption of  $^{137}\text{Cs}$  contaminated **lactic products** is characteristic.

## V. Epilogue

As stated in the Preface, this overview also is *a call for participation by scholars and investigators* interested in *long term health effects of Chernobyl* IR exposures to join us or propose their own investigations. OMNI-Net has the capacity to facilitate the creation of ad-hoc human population cohorts for investigations. *We invite scientists and graduate students* to join in this initiative. OMNI-Net provides scientific and clinical studies research platforms that are designed to expedite implementation of research projects. Each OMNI-Net team includes English competent staff, physicians and telecommunication facilities.

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## *Explanatory Notes*

### **N.B. 1**

#### **Names analogies and spellings**

\*Polissia, Polesie, Poliesye, Polesia, Polesye, Poles'e  
Pripyat, Prepet, Pripet, Prypet, Prepyet or Pinsk Marshes or Polesian Low-lands  
Polishchuks, Polesians, Pinchuks, Poleszhuk, Palyashuk, Poleshchuk, or Pleshuk.  
Chornobyl, Chernobyl  
Kyiv, Kiev, Kieff, Kiow  
Volyn, Volinia, Volhynia, Vollinya, Vollinia  
Rivne, Rovno, Ruvno  
Halych, Halychyna, Halic, Galice, Gaulics, Galicia, Galizia, Galicz, Galizien  
Lviv, Lvov, Lvoff, Lemberg.  
Volodymyr, Vladimir, Wladimir, Wlodzymierz, Lodomyr, Lodomiria  
Buh, Bug

(\*First spelling is in Ukrainian)

### **N.B. 2**

**Geographically, Polissia** (Pripyat Marshes or Polesian Lowlands) with the exception of small areas in Poland and Russia, **is located** in northern regions of Ukraine and southern regions of Belarus. Polissia is roughly as **large as Bavaria** and extends from west to east some 480 km or 300 miles and from North to South, some 140 miles or 225 km to each side of the course of the Prypiat river. Polissia includes the **largest wetlands in Europe** is characterized by numerous swamps, moors, lakes and ponds that undergo substantial flooding each spring. The wetlands cover about 38,000 square miles or 99,000 km. UNESCO Biosphere Reserves of Polissia's zones were established in Poland, Ukraine and Belarus (Pleski Park Narodowy; Shatskiy reserve and Pribuzhskoye-Polesie). Polissia extends across the northern areas of five Oblasts (from west to east, Volyn, Rivne, Zhytomyr, Kyiv and Chernihiv Oblasts or provinces). In Belarus, Polissia is found in the southern areas of four provinces (Brest, Pinsk, Kalinkavichy and Homel).

**N.B. 3** Highlights and explanatory notes of *relationships of Polissia and Polyshchuks with Volyn, Rivne, Ukrainian national sentiments, Chornobyl, Prypiat and “atom-towns”*.

### **History of the Region**

The Primary Chronicle of Rus, compiled before the 13th Century, describes the migration of Slavic tribes and notes that the lands north of the *Prypiat* river (now in Belarus) were settled by Drehovichs tribes and that the lands to the south (now in Ukraine) were settled by Drevians tribes. Further south from the Drevians, the *Vollynian* tribes settled the area that gave rise to the Volyn Principality, now represented by *Volyn, Rivne and Khmelnytsky* oblasts (provinces). Historic Volyn included *Polissia* and extended southward from the Prypiat marshes to the Southern Bug river (not to be confused with the western Bug river that constitutes most of the frontier separating Poland from Belarus and Ukraine). Eastward, Volyn reached the Kyiv Principality and westward *Galicia or Halych*. By the 13th Century Halych–Volyn arose and became a principality which in 1349 was absorbed by the Polish Kingdom. Several partitions of Poland led to the absorption of western Polissia-Volyn by Poland and eastern Polissia-Volyn regions by Russia. After the World War II western and eastern Polissia were reunited and absorbed by the USSR. The eastern half became Rivne oblast and its capital is Rivne city and the western half became Volyn oblast and its capital is Lutsk. Only after Ukrainian independence in 1991, Rivne and Volyn Polissia regions were declared to be damaged by Chornobyl IR. (see “History of Ukraine – Rus” vol. 1 by Mykhailo Hrushevsky. Canadian Institute of Ukrainian Studies Press, University of Alberta and University of Toronto – 1997 ISBN 1-8955710-19). Linguists note that Polissia dialects correlate with other cultural and historical characteristics representing archaisms peculiar to ancient tribal settlements of these regions and which have remained relatively stable for at least the last three centuries.

*Mythology, Folklore* and other aspects of traditional Polishchuk culture have been extensively studied by Ukrainian ethnologists. Of particular interest in the context of this review is an authoritative review of the role of the *Polissia-Midwife* by Dr. Olena Boriak, from the Rylskij Institute of Folklore and Ethnology of the Ukrainian National Academy of Sciences (in the J. Slavic East Europ. Folklore Assoc. - ISSN 1920-0242).

### **Chornobyl city and Prypiat town**

*Chornobyl city is an ancient* city located on the banks of the river *Prypiat* and is mentioned in 1193, as an important site of the Duchy of Kiev. The name Chornobyl means “mugwort” or wormwood (*Artemisia*), which grows in abundance in this area. Historically, the main economic activities centered on fishing, harvesting timber and peat and collecting mushrooms and berries as is the case today in *Rivne-Polissia*. Following the nuclear disaster in Prypiat in 1986, this historic city fell within the “exclusion zone”, its 17,000 inhabitants were evacuated and Chornobyl became a ghost town.

Prypiat, now also a ghost town, arose in 1970 along with the V. I. Lenin nuclear plant. The plant was renamed Chornobyl and the city became Prypiat. Like other “atom-towns”, Prypiat arose to house workers of the adjacent nuclear plant, its population at the time the explosion reached 50, 000, all of whom were evacuated, transforming Prypiat into a ghost town. The replacement town of Prypiat is Slavutych, built after 1986 to accommodate scientists and workers who continue to work in the Chornobyl nuclear plant.



“*Atom-towns*”, like Prypiat, Kuznetsovsk and Netishyn described in the overview, under the USSR had a special status including being exempt from subordination to oblast-regional authorities. Until the independence of Ukraine in 2001, “atom-towns” did not report birth rates nor congenital malformations to regional health authorities (reports were submitted directly to the Atomic Energy Agency and Ministry of Health - currently, health programs of “atom-cities” are dually funded by these agencies).

#### N.B. 4

**1991 Law Decree** “Regarding Status and Social Protection of Persons who Suffered from Chernobyl Catastrophe (extract) Article 2. Definition of zones of radioactively polluted territories. (*unofficial informal translation by Ministry of Health teams*)

According to landscape and geochemical peculiarities of soils, measurements exceeding limit levels of natural pre-fault radionuclide accumulation in the environment, ... taking into account common manufacturing, social and living activities, the territory which has been radioactively polluted by the Chernobyl catastrophe is divided into zones. The zones include:

- 1) Disposal zone – territory from which the whole population was evacuated in 1986;
- 2) Zone of unconditional (compulsory) resettlement – territories intensively polluted by long-life radionuclides with ground pollution density exceeding pre-fault situation by Cs isotopes 15.0 Cu/km<sup>2</sup> and above or Sr isotopes 3.0 Cu/km<sup>2</sup> and above or Pu isotopes 0.1 Cu/km<sup>2</sup> and above, where calculated effective equivalent dose of human IR (radionuclide plant migration and other factors are taken into account) can exceed 5.0 mSv (0.5 rem) per year in excess of a dose a person could get in pre-fault period;
- 3) Zone of guaranteed voluntary resettlement – territory with ground pollution density exceeding pre-fault situation by Cs isotopes 5.0-15.0 Cu/km<sup>2</sup> or Sr isotopes 0.15-3.0 Cu/km<sup>2</sup> or Pu isotopes 0.01-0.1 Cu/km<sup>2</sup> where calculated effective equivalent dose of human IR (radionuclide plant migration and other factors are taken into account) can exceed 1.0 mSv (0.1 rem) per year in excess of a dose a person could get in pre-fault period;
- 4) Zone of enhanced radio-ecological control – territory with ground pollution density exceeding pre-fault situation by Cs isotopes 1.0-5.0 Cu/km<sup>2</sup> or Sr isotopes 0.02-0.15 Cu/km<sup>2</sup> or Pu isotopes 0.005-0.01 Cu/km<sup>2</sup> under condition that calculated effective equivalent dose of human irradiation (radionuclide plant migration and other factors are taken into account) exceeds 0.5 mSv (0.05 rem) per year in excess of a dose a person could get in pre-fault period.

... Criteria for zone division are defined by the National Commission on IR Protection of Ukrainian Population. Zone borders are defined and reviewed by the Cabinet of Ministers of Ukraine based on expert conclusions of the National Commission on IR Protection of Ukrainian Population, National Academy of Sciences of Ukraine, specifically designated central executive agencies in the fields of health care, elimination of Chernobyl catastrophe consequences, agrarian policy, environment protection following submissions of regional soviets and followed by Verkhovna Rada of Ukraine approval. List of settlements belonging to each radioactive pollution zone and data of **annual dosimetric categorization** indicating estimated population irradiation should be issued by the Cabinet of Ministers of Ukraine once every three years beginning in

*2009. Zone maps, list of settlements in each zone and annual dosimetric categorization data with estimated population irradiation levels should be published once in three years in national and regional printing mass media and should be kept in respective central and local state agencies.*

*Extract of Decree regarding Polissia - Cabinet of Ministers of Ukraine - Decree - 25<sup>th</sup> of December of 1988 – Number 2068 - Kyiv.*

Re: Determinations regarding the Territories of Polissia in Ukraine.

To implement the Decree of the President of Ukraine of the 18<sup>th</sup> of June Number 652 (652/98) The Cabinet of Ministers of Ukraine mandates:...

V. Pustovoitenko, Prime Minister of Ukraine

**List of Territories belonging to Polissia:**

**Volyn Oblast**

Kamin-Kashytsky, Kovel, Liubeshiv, Liubomir, Manevychi, Ratne, Rozhyshche, Stara Vyzhva, Turiysk, Shatsk raions, northern part of Volodymyr-Volynsky raion, part of Kivertsy raion (excluding southern and south-western parts) and the very northern part of Lokachi raion

**Rivne Oblast**

Berezhne, Volodymyrets, Dubrovytsia, Zarichne, Kostopil, Rokytno, Sarny raions, northern part of Hoshcha, Korets and Rivne raions, southern part of Dubno and Radyvyliv raions and some small areas on the south of Ostroh raion.

**End**